JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

VOL. LXII.

PART I. (HISTORY, ANTIQUITIES, &c.)

NOS. I TO IV.—1893: WITH 9 PLATES.

EDITED BY THE

HONORARY PHILOLOGICAL SECRETARY.

> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES

CALCUTTA:
PRINTED AT THE BAPTIST MISSION PRESS,
AND PUBLISHED BY THE
ASIATIC SOCIETY, 57, PARK STREET.
1894.

CONTENTS

OF THE

JOURNAL, ASIATIC SOCIETY OF BENGAL, Vol. LXII, Part I,

FOR 1893.

No. 1.

Page

The Weber MSS.—Another collection of ancient manuscripts from Central Asia—By A. F. Rudolf Hoernle. (With four Plates.) 1

On the Early Study of Indian Vernaculars in Europe—By G. A. Grierson, Esq., I. C. S. (With one Plate.) 41

Note on the History of the East India Company's Coinage, from 1753–1835*—By* Edgar Thurston 52

Græco-Roman Influence on the Civilization of Ancient India. Supplementary Note—By Vincent Arthur Smith, M. R. A. S., *Indian Civil Service* 84

Uriyá Inscriptions of the 15*th and* 16*th centuries—By* Babu Mon Mohun Chakravarti, M. A., B. L., *Subordinate Executive Service of Bengal* 88

No. 2.

The Topography of old Fort William—By C. R. Wilson, M.A. (With two Plates.) 104

A specimen of the Padumāwati—By G. A. Grierson, B.A., I.C.S. ... 127

No. 3.

Study of Sanskrit in Ceylon—By Paṇḍit Harimohan Vidyábhúshaṇ 211

A brief account of Bháskara, and of the works written, and discoveries made by him—By the late Paṇḍit Bápu Deva S'ástri, C.I.E. 223

On some New or rare Muhammadan and Hindú Coins, No. III—By Dr. A. F. Rudolf Hoernle. (With two Plates.) ... 23

On a new Find of old Nepalese Manuscripts—By Paṇḍit Hara Prasád S'ástri 245

No. 4.

Note on the official Reckonings of the Reigns of the Later Moghul Emperors, and on some of their Mint Towns—By W. IRVINE, ESQ., I.C.S. (Retired.) 256
Note on the preceding Paper—By DR. A. F. RUDOLF HOERNLE ... 265
The Koch Kings of Kámarúpa—By E. A. GAIT, ESQ., I.C.S. ... 268
Bíjapur Inscription of Dhavala of Hastikuṇḍi of the Vikrama year 1053. (*From the materials supplied by Munshí Deviprasád*)—*By* PROFESSOR F. KIELHORN, C.I.E., GÖTTINGEN 309
The site of Kurṇa Suvarṇa—By H. BEVERIDGE, B.C.S. (Retired.) 315

LIST OF PLATES

IN

JOURNAL, ASIATIC SOCIETY OF BENGAL, VOL. LXII, PART I,

FOR 1893.

Plates I–III—(p. 1). The Weber MSS. Found near Kugiar (Yarkand.)

Plate IV—(p. 5). Weber MSS. List of Central Asian Nâgâr Characters.

Plate V—(p. 46). Facsimile of the first page and a half of the Chinese printed book described by Bayer in 1728.

Plate VI—(p. 115). Plan of Fort William and part of the City of Calcutta, with a project for the fortifying of the Fort.

Plate VII—(p. 111). Plan of old Fort William, Calcutta.

Plate VIII—(p. 230). Some new or rare Muhammadan and Hindú Coins.

Plate IX—(p. 237). Some new or rare Muhammadan and Hindú Coins.

INDEX

TO

JOURNAL, ASIATIC SOCIETY OF BENGAL,

Vol. LXII, Part I, for 1893.

Abú Bakr Ṣiddíq, the first Caliph, 143.
Ábá Bakr, Sayyad, invades Áhom country, 298.
'Abdu'l-Qádir Jilání, Musalmán Saint, 153.
'Abdu's-salám, Attacked by Bali Náráyaṇa, 299.
Abhaya-paddhati, Comm. on the *Buddhakapála*, MS. of, 252.
Abhayakára, Author of *Buddhakapálaṭíká*, 252.
Abú Sayyad, Musalmán Saint, 153.
'Adal, son of Sher Sháh, 147.
Ádiśúra, cannot have been later than 6th Century, 323.
Áditya Náráyaṇa, of Darrang, 308.
Agastya, when this star rises, Autumn begins, 201.
Aḥmad Sháh of Gujarát, coin of, 245.
Ajmere, East India Co's. coinage in, 75.
'Akár Nágarí' = Devanágarí, 46.
Akbar, coin of Jahángír, with his name, 244.
Akbar, Unites with Nara Náráyaṇa against the Pasha of Gauṛ, 291, 297.
'Álamgír, official date of accession of, 256, 265.
'Álamgírpur, mint town of Mughal Emperors, 263.
Alasadda = Alasanna = Alexandria = Alasanda dípa, *q. v.*
Alasanda-dípa, site of, 86.
'Aláu'd-dín 188 and ff.
'Alexandria = Alasanda, 86.
Alhadád, Musalmán Saint, 152, 153.
'Alí, fourth Caliph, 143, 144.
Alláhábád, East India Co's. coinage in, 64, 65.
Alphabetum Brammhanicum, 48.
Amarakosha, Old MS. of, 250.
Ameṭhí, Rájá of, a patron of Malik Muḥammad, 129.
Ananta, son of Viśva Siṁha, 286.
Aṅgirasa, Eulogy of, in Weber MSS., 24.
Aniruddha, carries off Ushá from S'oṇitapura in Assam, 273.
Aṅka, system of dating by, in Oṛissá, 89.
Antarodha, a *Bisi* in Oṛissá, 92.
Antonio, a Missionary who translated Gospels and Acts into dialect of Bhágulpur, 41.
Árimat, King of Assam (1238 A.D.), 275.
Árya Kshemíśvara, author of *Chhaṇḍokauśika*, 250.
Asad Beg, Ágá, in charge of Benares Mint, (1752–54)55.
Ásámburañjis of Biśveśvar, and Rai Guṇábhirám Barua, 268, note.*
Ashraf Jahángír, Muḥammadan Saint, 150, 153.
Áśokávadánamálá, 246.
Assam, Great roads in, 283, 286, 279, 287.
Assam, Musalmán invasions of, 279, 280.
Astrological omens, 183.
Auchityálaṅkára of Kshemendra, quotes from Kumáradása, 214.
Aurangzíb, official date of accession of, 256, 265.

Bábákar, name of Ábá Bakr in *A'hom Buranji*, 298.
Bactria never included the Indus, 86.
Bádal, Padmávatí's nephew, 194, 200 and ff.
Baḍe, Shaikh, a friend of Malik Muḥammad, 155.
Bodhicháryávatára, New Comm. on, 246.
Bagh'sar, Battle of, in which Sher Sháh defeated Humáyún, 128.
Bahádur Sháh, official date of accession, 261, 265.
Baháu'd-dín Zikariyá, Musalmán Saint 154.
Bahlol Lodí of Lahor, 240.
Balabhadra, a Saint at Hastikuṇḍí, 310.
'Balabandu', = Maráṭhí alphabet, 46.
Balwant Siṅgh, Rájá of Benares, in charge of Benares Mint (1748-50), 54.
Bál Gosáiṅ, Musalmán name of Nara Náráyaṇa, 295 *n*.

BALI, quoted as generous, 149.
BALI NÁRÁYAṆA, son of Raghu Rái, invokes aid of Áhoms against the Musalmáns, 293.
————, takes name of Dharma Náráyaṇa, 294.
————, date of, 305.
————, his war with the Musalmáns, 299 and ff.
BALLÁLA SENA, 251.
BÁṆA, King of S'onitapura in Assam, 273.
Báñchás, a Bisi in Orissá, 92.
BÁPÚ DEVA S'ÁSTRI, article by, on Bháskara, 223 and 66.
Báráṇasi = Kaṭak (Cuttack), 101.
Bárah Mása, 181.
Barailí, East India Company's coinage in, 64, 65, 66.
Barman, a Kshattriya title in Assam, 274
Báro Bhuiyás, Assam traditions regarding, 282.
————, account of, 281.
BAYER, Theophilus Siegfried. Correspondence with La Croze, 44.
BAYNE, Mr., discoveries in connection with old Fort William, 105.
Benares, East Indian Company's coinage in, 54, 63, 65, 67, 70, 71, 72, 73, 75, 79.
————, Mint established at, 1734, 54.
Bengal, East India Company's coinage in, 53, 60, 61, 62 73, 80, 83.
Bengálí language described in *Sprachmeister*, 48.
BEVERIDGE, H., identifies Karṇa Suvarṇa with Raṅgamáṭi, 315 and ff.
BHAGADATTA, son of Naraka. King of Prágjyotisha, 271.
BHÁSKARA, was he acquainted with the Differential Calculus, 226.
————, discoveries made by, 226 & 66.
————, date and place of his birth, 220.
BHÁSKARA VARMAN, king of Kámarúpa in Hiuen Tsiang's time, 273.
BHAVA CHANDRA, Raṅgpur King of the Pála dynasty, 278.
BHÍMA RÁJÁ of Koch Bihár, 306.
BHÍMA, name of a king killed by Vigraha Pála, 276.
BHISHMAKA, father of Rukmiṇí, an Assamese (not a Vidarbha) Prince, in Assam history, 272.
Bhotiyá characters, 5.
BHÚMI PÁLAS of Assam, 275.
Binding, Method of, in Central Asian MSS., 2.
Bible, translations of, into Indian Vernaculars, 41.
Bíjapur inscription, described by Prof. Kielhorn, 309 and ff.
Bijní family of Koch Hájo, 307.
Birdánási, a quarter of Kaṭak (Cuttack), 101.
Birds, list of, identified, 210.
BISU AND S'IŚU progenitors of Koch Kings of Kámarúpa, 285, 294.
BISU, founder of Koch Kings of Kámarúpa, takes name of Viśva Siṁha, 285.
BIŚVEŚVAR, author of Ásámburañji, 268 note.†
Black Hole of Calcutta, site of, 124.
Blood of Bráhman, white, 286 *n*.
Bombay, East India Company's coinage in, 63, 72, 75, 76, 78.
Bráhman, blood of, white, 286 *n*.
Brahmaputra, straightened by Nara Náráyaṇa, 290.
Buddhakapála-ṭíká, MS. of, 252.
Buddhist inscription deciphered by Bayer, 1728, 45.
BURHÁN, Shaikh, Musalmán Saint, 128, 152, 153.
Bu-ston Chos byuñ, 6.
Buxar, see Bagh'sar.

Cachar or Hiḍamba conquered by S'ilarái, 289
Calcutta, coinage in, 53, 74, 78, 79, 81.
————, mint established at (1753), 53.
Central Asian MSS., how shaped, and how bound, 2.
Ceylon, attacks on Bengal, 324 and ff.
————, study of Sanskrit in, 211.
CHAIT SINGH, in charge of Benares mint (1776), 56.
CHAKRAVARTÍ, Mon Mohan, article on Uṛiyá Inscriptions of 15th and 16th centuries, 88.
CHAKRADHVAJA, of Khyen dynasty in Assam, 279.
CHAKRA PÁLA of Assam, 275.
CHAMBERLAYNE'S correspondence with La Croze, 43.
CHAMBERLAYNE'S Orationum dominicarum sylloge, 43 note*, 43.
CHAMPÁVATÍ, Queen of Gandharva Sena 163.
CHAND BAR'DÁÍ, 127.
Chaṇḍakauśika, drama, MS. of, 250.
CHANDANA AND MADANA, ruled at Marálávása in Assam (1511), 283*n*, 294.
CHAṆḌEŚVARA, wrote works on Smṛiti, 251, 252.
CHAṆḌÍVARA, the most famous of the Báro Bhuiyás, 283.
CHANDRA NÁRÁYAṆA of Darraṅg, 307.
CHANDRA PÁLA of Assam, 275, and 276*n*.

Chándra-vyákaraṇa complete MS. fo, 249.
Charm given by Buddha to Maṇibhadra in Weber MSS., 26, 32.
Chaurá Goharsháhí, a kind of rupee, 57.
Chedí, Kalachurí Kings of, 239, and ff. coins of, *ib*.
———, two contemporary kingdoms, 242.
China warriors from Assam, 272.
Chitaur, fortress of, 164 and ff.
CHITRA SENA, king of Chitaur, 164.
Choice of heir, legendary folktale of Viśva Siṁha, 286.
CHORÁ DEVA, Súryavaṁśa, (1022–1063), 251.
Coins, new or rare Muhammadan or Hindú, 230 and ff.
COLEBROOKE's opinion of Hindustání, 50.
'Comotay' = Kamaṭhapura, 278.
Cuttack, East India Co.'s coinage in, 65.
———, see Báráṇási.

D'ALWIS, restored Jánakí-haraṇa, 217.
Dacca, East Indian Co.'s coinage in, 59, 60, 62.
Dakshiṇadiga daṇḍapáṭa, 92.
DAKSHYA PÁLA of Assam, 275.
DÁNIYÁL, Musalmán Saint, 152, 153.
DÁNYÁL, son of Ḥusain Sháh, 280.
Daphne papyracea, used for paper-making, 3.
DÁÚD SHÁH of Gauṛ subjugated by Akbar with help of Nara Naráyaṇa 291, 297.
Delhi, coins of Sulṭáns of, 243.
Delhi, East India Co's. coinage in, 74, 78, 79.
DEVA PÁLA, 227, *n*.
DEVA PÁLA, Rájá of Kambhal'ner, 197, 204.
DEVA-VID SIṀHA teaches Tibetans the Alphabet, 6.
DEVEŚVARA, a King of Kámarúpa 273.
DEVÍPRASÁD, Munshi, supplies materials for Bíjapur inscriptions, 309.
Dh in Central Asian Nágarí, 4.
DHAMBA PÁLA (of Assam?) 276, *n*.
DHARMA NÁRÁYAṆA, see Bali Náráyaṇa, 294.
——— Gauḍeśvara, war with Durlabha, *n*. 282.
DHARMA PÁLA 277 *n*.
———, founded a dynasty in Raṇgpur, 278.
———, grants land in Kámarúpa, 276.
DHARMÁRÁMA, Bhikshu, has restored Jánakí Haraṇa, 216.
DHARAṆÍVARÁHA, mentioned in Bíjapur inscription.
DHAVALA, King of Hastikuṇḍí (997 A. D.), 310.
Dhívriddhida, astronomical work by Lalla, 224.
Dictionary in Weber MSS., 30.
Ḍimuriá, Rájá of, submits to Nara Náráyaṇa, 290.
———, Rájá of, does not eat Ari fish, being descendant of Arimat, 275, *n*.
DÍPA SIṀHA, son of Viśva Siṁha, 286.
DONVILLE, a Jesuit Missionary in Nepal, 41, note 3.
DURLABHA NÁRÁYAṆA of Kamaṭhapura, attacks Dharma Náráyaṇa, 282.
DURLABHA RÁJÁ, mentioned in Bíjapur inscription, 311.
Dvípas, the seven, 133, note 5.

E in Central Asian Nágarí, 4.
Edgeworthia Gardneri used for paper making, 3.
Elephants, common in Assam, 274.
EUKRATIDES, coin of, mentions Karisinagara, 86.

FARRUKHSIYÁR, official date of accession of, 262.
Farrukhábád, East Indian Co's coinage in, 64, 66, 69, 73, 74, 75.
Flowers, list of, identified, 207.
Fort William, site of, 104, & ff.
———, site of South Curtain Wall, 117.
———, site of West Curtain, 120.
———, site of Writers' Buildings, 120.
———, site of East Gate, 121.
———, site of Black-Hole, 124.
———, site of Governor's House, 115.
FRITZ, Johann Friedrich, compiler of *Sprachmeister*, 47.

GAIT, E. A. Article on the Koch Kings of Kámarúpa, 268 and.
GAJAṄG, King in Assam, 275.
GANDHA PÁLA of Assam, 276, & *n*.
Gandharian (Kharoshṭrí) character, survived in Gandhára to 3rd cent. A. D., 85.
GANDHARVA SENA King of Siṁhala, 160 & ff.
GANDHARV RÁJ, a friend of Malik Muḥammad, 155.
GÁṄGEYADEVA, Kalachurí king of Chedí, 242.
Gaṇitádhyáya, by Bháskara, 224 and ff.
Gaṇakas, or astrologers, influence of 297 *n*.

Gauháṭí, seat of Muhammadan power in Assam, 301.
GAYAKARṆADEVA, Kalachuri king of Chedí, 242.
'Gentoo' or 'Moors' = Urdú, 47.
GHAṬAKA KIRÁTA, king of Kámarúpa, 270.
GHIYÁṢU'D-DÍN BAHÁDUR SHÁH, invades Assam, (1220 A. D.), 280.
Ghoṛágháṭa, road to, from Kamaṭhapura made by Nílámbara, 279.
GHULÁM 'ALÍ 'ISHRAT, author, 128.
Ghurshahee = *Goharsháhí*, *q. v.*
'Girandam' = Kirendum, *q. v.*, 44, note.[1]
Goharsháhí, a kind of rupee, 57.
Goládhyáya, by Bháskara, 224 and ff.
GONDOPHARES, era of, 85.
Go PÁLA I, 277 *n.*
Go PÁLA II, 277 *n.*
Gopapura, a village in Oṛissá, 92.
Gorakhpur, East India Co.'s coinage in, 64.
GORÁ, Padmávatí's uncle, 194, 200 and ff.
GOSÁIÑ KAMALA, son of Viśva Siṁha, 286.
—————, a great road-maker in Assam, 286.
—————, builds Gosáiñ Kamala Álí 287.
Gosáiñ Kamala Álí, N. of road, in Assam, 288.
Gotras of *Nakshatras* in Weber MSS., 14, 16.
GOVINDAPÁLA, (1161), 250.
GOVINDAPÁLA, (1198), 253.
Grammar, *Chándra Vyákáraṇa*, complete MS. of, 249.
Gramtsodee character, 5.
Grantham, in Sanskṛit, called Kirendum, 44.
GRIERSON, G. A., Article on early Study of Indian Vernaculars in Europe, 41 and ff.
GRIERSON, G. A., A specimen of the Padamávatí, 127 and ff.
GRÜBER, a Jesuit Missionary in Nepál, 41, note.*
Gujarátí language described by Bayer, A. D. 1729, 47.
Gupta character, North Western Variety, in Weber MSS., 17, 21 *n.*
GUSHAN, see Kushan.

HACKEM BEG, see Hákim Beg.
HADLEY'S (1772) Hindústání grammar, 49.
HAJARA, descendant of Naraka, king of Assam, 272.
HÁJO, according to Buchanan Hamilton founded Koch Dynasty, 295.
HÁJO KOCH, father of Hirá and Jírá, 294.
HAINA PÁLA, óf Assam, 276 *n.*
HÁJÍ SHAIKH, Musalmán Saint, 151, 153.
HÁKIM BEG, Munshí at Murshidabád Court, 53, 107.
HÁKIM, Sayyad, invades Áhom country, 298.
Hammíra of Ran'thambhaur, 190.
Hanscrit, *i. e.*, Sanskrit, 43.
HARA PRASÁD S'ÁSTRÍ, Article by, on a new find of old Nepalese MSS., 245.
HAREWÁ, a noted robber chief, 192.
HARIÁ MAṆḌAL, ancestor of Koch Kings of Kámarúpa, 284.
HARI MOHAN VIDYÁBHÚSHAṆ, Article on the Study of Sanskrit in Ceylon, 211.
HARI PÁLA of Assam, 276 *n.*
HARIVARMAN, King of Hastikuṇḍí, of Ráshṭrakúṭa family, 311.
Hashtnagar inscription, date of, 85.
Hastikuṇḍí, inscription of, described by Prof. Kielhorn, 309 & ff.
Hastikuṇḍí or Hastikuṇḍiká, = modern Hatoṇḍí in Márwár, 310.
ḤÁTIM ṬÁE quoted as generous, 149.
Hatoṇḍí, the ancient Hastikuṇḍí, 310.
Hayagríva, temple of, inscription of Raghurái, 296.
Heir, method of choosing in Assam, by choice of bundles, 286.
HEMADHARA, son of Viśva Siṁha, 286.
HEMANTA SENA, great grand-father of Ballála S., fought with the Karṇaṭas, 251.
Hiḍamba or Cachár conquered by S'ílarái, 289.
HIDRÍ, ancestor of the Koch Kings of Kámarúpa, 284.
Hindústání grammars, old, (1745) 47, (1772) 49, (1778) 49.
HÍRÁ, ancestress of Koch Kings of Kámarúpa, 284.
———, daughter of Hájo Koch, 294.
HÍRÁMAṆI, name of parrot, 163 and ff.
HÍUEN TSIANG, describes Assam, 273.
—————, his itinerary from Champá to Oṛissá, 316.
—————, His Journey in Bengal and Assam, 315 and ff.
—————, His Travels, and his Life, 315.
HOERNLE, DR. A. F. RUDOLF, Article on new or rare Muhammadan or Hindú coins, 230 and ff.
HOERNLE, DR. A. F. RUDOLF, Article on Weber MSS. 1 and ff.
HOERNLE, DR. A. F. RUDOLF, Article on official dates of accession of Mughal Emperors, 265.
HUCKAM BEG, see Hákim Beg.
Human Sacrifices in Assam, by Nara Náráyaṇa, 291.

ḤUSAIN GHAZNAWÍ author of *Qiṣṣae Padmáwat*, 128.
Ḥusain Sháh of Gauḍa, besieges Kamaṭhapur, and takes Nílámbára captive, 1498 A. D., 279.
Hupián = Opián G. V.
HWUI-LI, author of Biography of Hiuen Tsiang, 315.

Ibrahím Lodí of Delhi, 243.
IKHTIYÁRU'D-DÍN YUZBAK TUGHRÍL KHÁN, invades Assam, (1256 A. D.), 280.
Imperial Academy of Sciences, St. Petersburg, founded in 1726, 45.
INDRA PÁLA of Assam, 276.
INDRA NÁRÁYAṆA of Darraṅg, 308.
Indus, not included in Bactria, 86.
IRVINE, W., article on the Official Reckoning of the reigns of the later Mughal Emperors, 256.
ISMÁ'ÍL GHÁẒÍ, invades Assam, (1460 A. D.), 281.

Jagannátha, temple of, at Purí, inscription at, 88.
JAGAT DEVA Mahárája, ally of Sher Sháh, 128.
JAGAT CHANDRA, son of Viśva Siṁha, 286.
JAHÁNDÁR SHÁH, official date of accession, 262.
JAHÁNGÍR, coins of, 244.
———, coin of, with Akbar's name, 244.
Jaintiá, conquered by S'ilarái, 289.
JÁJALLA DEVA I., Kalachurí King of Chedí, 240.
JÁJALLA DEVA II., Kalachurí King of Chedí, 240.
JÁJALLA DEVA, Kalachurí King of Chedí, coin of, 241 & ff.
JALÁLU'D-DÍN FATḤ SHÁH, coins of, 237.
JALÁLU'D-DÍN MUḤAMMAD SHÁH, coins of, 230.
JALÁLU'D-DÍN of Bukhárá, Musalmán Saint, 153.
JALÁL LODÍ of Jaunpur, 243.
JALÁL SHÁH, coin of, 243, 245.
JALASARA SENA, mentioned in Mádalá Páñjí, 93.
JALHANA, author of *Súkti muktávalí*, mentions Kumáradása, 215.
JALPEŚVARA, a king of Assam, 274.
Jánakí-haraṇa, poem by Kumáradása, account of, 212 & ff.
Jánakí-haraṇa, quotations from, in Sanskrit works, 214.
JAṄGÁL BÁLÁHU King of Assam, 275.
JAPANDU PÁLA (?) in Assam, 276 *n*.
Java supplied with coins from Bengal, 71.
Jayanagara, ancient town in Magádhá, 253.
JAYANTA PÁLA, of Assam, 275.
JAYA PÁLA, 277 *n*.
Jáyas, home of Malik Muḥammad, 127, 156.
Jayavijaya, doorway of Jagannátha temple, at Purí, 88.
Jesuit Missionaries in Nepál, 41, note 3.
Jhardár, a kind of rupee, 57.
JÍRÁ, ancestress of Koch Kings of Kámarúpa, 285.
——, daughter of Hájo Koch, 294.
JITÁRI, deserts Gauháṭi, 274.
JONES, Captain, on defences of Calcutta, 108 and ff.
JONES's plan of old Fort William, 106.
'JUGGUT SING,' 53.

KABÍR, influence of, on Malik Muḥammad, 127
Kaithí alphabet, described, (1771), 49.
Kajúghira. question as to its identification, 316.
Káka-dvípa (?Coconada), ravaged by Ceylonese, 324.
Kákkhordda in Weber and Bower MSS., 25, note 17.
Kalabaraga, name of a place in Orissa 91, 92, 96, 97, 98, 100, 101, 102, 103.
Kalachurí kings of Chedí, coins of, 239 and ff.
KÁLÁ PAHÁR, attacks Nara Náráyaṇa, (1553), 296.
Kalasi, birth-place of Milinda, identified, 85.
KALIDÁSA, visited Ceylon and died there, (6th century), 212 and ff.
Kalpí, residence of Shaikh Burhán, 128.
Kámákhyá, re-discovery of, by Viśva Siṁha, 287.
————, temple re-built, by Nara Náráyaṇa, 291.
————, temple of, inscription of S'ilarái in, 295.
KAMÁL SHEKH, Musalmán Saint, 151, 153.
KAMALA *PÁLA*, name of a Jaina copiest, 253.
Kámalpur, a village in Oṛissá, 92.
Kámarúpa, original extent of, 269.
———— origin of name, 269.
———— a famous place for pilgrimages, 273.
————, early kings of, 270.
————, the Koch Kings of, 268 and ff.
Kamaṭhapura, founded by Níladhvaja, in Koch Bihár, 278.
————, ruins of, described, 279.
KAMAṬHEŚVARA, title of Níladhvaja, 278.
KANISHKA, character of coins of, 85.

Kañchannagar, identified with Karṇa Suvarṇa by Dr. Waddell, 315.

Kansonapurí, old name of Raṇgamáṭí, 320.

KAPILEŚVARA DEVA, mentioned in inscription at Purí, 88.

Karaṇa, by Bháskara, 229.

Karisinagara, birth-place of Milinda, 85.

KARṆA quoted as generous, 149.

Karṇa Suvarṇa site of, paper on, by H. Beveridge, B. C. S., 315 & ff.

——— ———, located in, Bírbhûm, in Singhbhúm, in Burdwán, and at Raṅgamáṭi, 315.

Karṇaṭa, ruled over by Uṛiya kings, 91, 92, 96, 97, 98, 100, 101, 102, 103.

Karṇáṭaka dynasty of Nepál, 251.

Karnáṭas, enemies of Mahípála and of Hemanta Sena, 251.

KÁRTIKA, a nobleman at Mahípála's court, 251.

Kashgár MS., published by Oldenberg, read by Dr. Hoernle, 39.

Kashmír, original home of Wartu character, 6.

KÁŚÍ VIDYÁDHARA, mentioned in Mádalá Páñji, 93.

Kaṭak = Cuttack, see Báráṇasi.

Kátjori river, near Cuttack, 101.

Kha-che Tibetan for Káshmír, 6 and ff.

Khacheehee character, 5.

Khairam, rájá of, submits to Nara Náráyaṇa, 289.

Khaṇḍas, the nine, 145.

Kharoshṭrí, see Gandharian.

Khaṭ ritu, 181.

KHETALLYA DEVÍ, Rání, founded Vihára in Jayanagara, 253.

KHWÁJA KHIẒR, Musalmán Saint, 152, 153

Khyen dynasty of Assam, 278.

Kie-la-na-su-fa-la-na = Karṇa Suvarṇa, 315.

KIELHORN, Prof. F., C. I. E., describes Bijapur inscription, 309 and ff.

Kiráta warriors from Assam, 272.

'Kirendum' = Grantham, south Indian name of Sanskrit, 44.

Kitábu'l-fihrist, quoted, 321.

Koch Bihár and Koch Hájo, 295 *n*.

——— family, history of, 306.

———, invaded by Mír Jamla, 306.

——— dynasty, said to be founded by Hájo, 295.

———, said to be founded by Bisu or Viśva Siṁha, 285.

Koch Hájo and Koch Bihár, 295 *n*.

———Kings of Kámarúpa, 268 and ff.

——— ———, dates of, 305.

KOKALLA, Kalachurí king of Chedí, 240.

Kosha in Weber MSS., 30.

Kṛitibás, site of camp in Oṛissá, 103, 104.

KṚISHṆA invades Prágjyotishapura, 271, 272.

KṚISHṆA PÁLA of Assam, 276.

Kṛittiká series of Nakshatrás, 15.

KSHEMENDRA, author of Auchityálaṅkára quotes Kumáradása, 214, 15.

Kugiar, place where Weber MSS. found, 2.

Kukuṭa-káta, legend of, 271.

Kukhaṇḍa, the southern hemisphere, 134 note 2.

KUMÁRADÁSA, Sanskrit author in Ceylon, and king, (6th century) 212, and ff.

KUMÁRA PÁLA, in Assam, inscription of, 276.

Kumodiní, name of a bawd, 197.

Kundajori, zamíndárs of, in Oṛissá, repelled, 96.

Kuṇḍilya, the country round Sadiyá in, Assam, 272.

'Kurn-sona-ka-ghur' = Raṅgamáṭí, 320.

KUSHAN or GUSHAN, author of Panjtár, inscription, 85.

Kusumapurí, old name of Raṅgamátí, 324.

LA CROZE, 42 and ff, 50.

LAKHIÁ PÁLA of Assam, 276 *n*.

Lakshmaṇávatí = Jayanagara, 253.

LAKSHMÍ NÁRÁYAṆA, son of Nara Náráyaṇa, 292.

LAKSHMÍ NÁRÁYAṆA, ruler of Koch Bihár, 295 *n*.

——— ———, dates of, 305.

——— ——— and PARÍKSHÍT, war between, 290.

——— ———, pays respects to Emperor at Guzráṭ, 298.

——— ———, later history of his descendants, 306.

LAKSHMÍ NÁRÁYAṆA KUAR, possessor of *Vaṁśávali*, 268.

LAKSHMÍ PÁLÁ of Assam, 276.

LALLA, superseded by Bháskara, 224.

Language, unintelligible, in Weber MSS., 7, 35 and ff.

Lántsha alphabet, deciphered by Bayer, 17, 29, 46.

Lantsha character, introduced to Tibet through Nepal, 6.

Lenka, an official in Oṛissá, 101.

Lexicon Linguæ Indostanicæ, (1704), 49.

Liyul or Khoten included under Kha-che, 6.

Lokas, the fourteen, 133, note 6.

Lo-to-wei-chi = Raktaviṭi, 319.

M. in Central Asian Nágarí, 4.

MSS. from Central Asia, how bound; shape of, 2.

Machhlídár pice, 66.
MACTYA PÁLA of Assam, 276 *n*.
Mádalá Páñji, a chronicle of the temple of Jagannátha, 89 note.*
MÁDHAVA PÁLA of Assam, 276 and *n*.
Mádhotila, name of village in Oṛissá, 92.
MADHU NÁRÁYAṆA of Darraṅg, 308.
MADHU PÁLA of Assam, 276.
Madras, East India Co.'s, coinage in, 63, 69, 70, 72, 83.
Mahánágas, enumerated in Weber MS., 26, 32.
Mahátírtha = Mátara in Ceylon, 214.
MAHÁYAKSHA MAṆIBHADRA, in Weber MS., 26, 32.
MAHDÍ 'ALÍ KHÁN, introduced copper coins in Barailí, 66.
MAHENDRA NÁRÁYAṆA, of Darraṅg, succeeds Bali Náráyaṇa, 307.
MAHENDRA (?) mentioned in Bíjapur inscription, 311.
MAHEŚVARA, father of Bháskara, 224.
MAHÍ PÁLA, (1015–1040), 251, 277 *n*.
MAHÍNDRA (?) mentioned in Bíjapur inscription, 211.
MAHÍRÁVAṆA, 183.
MAHÍRAṄGA DÁNAVA, earliest recorded king of Kámarúpa, 270.
MAIDAN, son of Viśva Siṁha, 286.
Maithili, translations of the Bible into, 41.
Májí, original site of inscriptions in Lahore Museum, 85.
MALIK MUḤAMMAD, author of Padumáwati, 27.
MALLÁ DEVA, aliás Nara Náráyaṇa, son of Viśva Siṁha, 286.
Mallikâ, a country conquered by Kapileśvara Deva of Oṛissá, 99.
MAṀMAṬA, king of Hastikuṇḍi of Ráshṭrakúṭa family, date of (937 V. S.), 311.
MÁNA SIṀHA, son of Viśva Siṁha, 286.
MÁNAGOVINDA GOVINDA DEVA, mentioned in inscription at Purí, 88.
MÁṆIBHADRA, in Weber MSS., 26, 32.
Maṇipura submits to Nárá Náráyaṇa, 289.
MANZ̲ÚR KHÁN, defeats Súrya Náráyaṇa of Darraṅg, (1682), 308.
'Maura' language described by Bayer, (1729), 47.
MANTRÍ PÁLA of Assam, 276 *n*.
Maráṭhí language, described by Bayer, (1729), 47.
Másas, description of the twelve, 181.
Mátara in Ceylon, town of Kálidása's death, 214.
Mauritius, applies to Bengal for coins, 73, 76.
MECHÁ, son of Viśva Siṁha, 286.
MEGHA NÁRÁYAṆA, son of Viśva Siṁha, 286.
MENANDER, see Milinda.
Meru, the Northern hemisphere, 134 note 2.
MESSERSCHMID, deputed by Peter the Great to explore Siberia, 45.
MILINDA, birth-place of, identified, 85.
MIMAṄG, king in Assam, 275.
Mint established at Calcutta, (1753), 53.
——————— Benares, (1734), 54.
Mint towns of Mughal Emperors, 263 and ff.
MÍR JUMLA, war of, with Koch Bíhár, 306.
Moga, era of, 85.
Mohars, (gold) 59, 62.
Mongolian alphabet, described by Bayer, (1729), 46.
Months, description of the twelve, 181.
Moors or Gentoo = Urdú, 47.
MOTT, author of a collection of translations of the Lord's Prayer, 42 note 2.
MRIGÁṄG, king in Assam, 275.
Mu'az̲z̲amábád, mint town of Mughal Emperors, 264.
MUBÁRAK SHÁH, coin of, 243.
MUBÁRAK, SHEKH, Musalmán Saint, 151, 153.
Mughal Emperors of Delhi, coins of, 244.
Mughal Emperors, official reckoning of the reigns of, 256.
MUḤAMMAD, Saiyad, a Musalmán Saint, 152, 153.
MUḤAMMAD SHÁH, Official date of accession, 263.
———————, coin of, 243.
MUḤAMMAD SHÁH IV BIN FARÍD of Delhi, 243.
MUḤAMMAD SHÁH, son of Tug̲h̲luq Sháh, invades Assam, (1337), 281.
MUḤIU'D-DÍN, Preceptor of Malik Muḥammad, 128, 152, 153.
Muhúrtas, number of *nakshatras*, in Weber MSS., 17.
MUKARRAM KHÁN, defeats Paríkshit, 293.
MÚLARÁJA (Chaulukya), mentioned as Bíjapur inscription, 311.
MUÑJARAJA mentioned in Bíjapur inscription, 311.
MUNRO, MR., discoveries in connexion with Old Fort William, 105.
Murshidábád, East Indian Co.'s coinage in, 54, 59, 60, 62.
MURU, an Asura, killed by Kṛishṇa, 271.
Musalmáns, invasions of in Assam, 279, 280.
Musalmáns attack Paríkshit and Bali Náráyaṇa, 293.

Musalmáns, attacks of upon Koch Kings, 296 and ff.

NÁGAMATÍ, Queen of Ratna Sena, 165 and ff.
Nágarí character (Central Asian), 4 & ff, 24, 26, 31, 32, 35.
NÁGAŚAṄKARA or NÁGÁKHYA, an Assam King, 273.
Nakh'sikh, a, 166, 189.
Nakshatras in Weber MSS., 13 & ff.
——— -- *kalpa*, 16.
NÁNYADEVA, founder of Karṇáṭaka dynasty of Nepál, defeated by Vijaya Sena, 251.
NARAKA, founded dynasty in Kámarúpa, 279.
NARA NÁRÁYAṆA, son of Viśva Siṁha, 286.
——— conquers Nara Siṁha and succeed Viśva Siṁha, 287.
——— conquers the Áhom King of Assam, 288.
——— makes Maṇipura tributary to him, 289.
——— makes Rájá of Khairam tributary, 289.
——— straightens the course of the Brahmaputra, 290.
——— unites with Akbar against Gaur, 291, 297.
——— rebuilds the Kámákhyá temple, 291.
——— called by Musalmáns, Bál Gosáiñ, 295 *n.*
——— submits to Emperor of Delhi, (1578), 297.
———, dates of, 301 and ff.
NARA SIṀHA, son of Viśva Siṁha, 286.
———, becomes ruler of Bhotán, 287.
NÁRÁYAṆA PÁLA of Assam, 276 and *n.*, 277 *n.*
Naṣratábád, mint town of Mughal Emperors, 264.
NÁṢIRU'D-DÍN MAḤMÚD SHÁH, coins of, 231 and ff.
NAUSHERWÁN, 147.
Náyiká bheda, 189.
NAYA PÁLA, 277 *n.*
NEKUSIYÁR, official date of accession, 263.
Nepál, Karṇáṭaka, dynasty of, 251.
Nepalese paper, 3.
Nepálí, Christian works in that language, 41.
NÍLADHVAJA, deposes last Pála of Assam, and ascends throne, 278.
NÍLÁMBARA, last Khyen King of Assam. His life, 279.
NÚR QUṬB 'Álam, Musalmán Saint, 154
NIẒÁMU'D-DÍN AULIYÁ, 128, 152, 153.

Oṁ, maṇi padme, huṁ, deciphered by Bayer, (1728), 45.
Orationum dominicarum Sylloge, by Chamberlayne, 42 note 2, 43.
Orientalisch-und-occidentalischer Sprachmeister, by Fritz, (1748), 47.
Opián, site of Alasanda, 86.
Omens, 168, 183.
Ornaments, list of, presented to Jagannátha, 95.

Pada-chandriká, a comm. on *Amarakosha* 215.
PADMÁVATI, Princess of Siṁhala, 163 and ff.
Padmávatí, see *Paduwámáti*.
Padumáwáti, specimen of, 127.
PAKSHYA PÁLA of Assam, 275, 276 *n.*
PÁLA, a king in Raṅgpur, 278.
PÁLA, DÉVA, Rájá of Kambhal'ner, 197, 204.
Pála dynasty, account of, 276 *n.*
Pála, a tribal name in Assam, 278.
PÁLA, kings in Assam, list of, 275.
Paṇḍunátha, near Gauháṭí, founded by Paríkshit, 293.
Paṇḍunátha, near Gauháṭí, 290.
Panjtár inscription, date of, 85.
Paper, Nepalese, 3.
Papphala (? Pippli), ravaged by Ceylonese, 324.
PARÁKRAMA BÁHU of Ceylon, probably destroyed Raṅgamáṭí, 324.
PARAN SUBHÁ defeats Paríkshit, 293.
PÁRVATÍ, *stotra*, in honour of, in Weber MSS., 20.
PARÍKSHÍT, son of Raghu Rái, succeeds him, and founds capital at Paṇḍúnátha, 293.
———, defeated by Paran Subhá and Mukarram Khán, 293.
———, ruler of Koch Hájo, 295 *n.*
———, war with the Musalmáns, as described by the latter, 298.
———, dates of, 305.
Paṭhán Sultáns of Delhi, coins of, 243.
Paṭna, East India Co., coinage in, 54, 59, 60, 62.
Pauṇḍra Vardhana, question as to its identification, 316.
———, suggested identification of, with Sarkar of Panjra, 318 *n.*
PETERSON, Prof., on date of Kumáradása, 214, 15.
PHENGUA, Rájá, king in Assam, 275.
Pice, coinage of, 58, 62.
PINNA, Father, wrote a catechism in Urdu, in 1740, 41 note 3, 42.

PLAISTED's plan of Old Fort William, 106.
————, in charge of construction of Fort William, 108, 110.
Pookangkee character, 5.
Portuguese Hindústání grammar, 49
Prágjyotishapura (Gauháṭí), founded by Naraka, 270.
————invaded by Kṛishṇa, 271.
PRAJÑÁKARA, author of Comm. on *Bodhicharyávatára*, 246.
Prajṇápáramitá, MS. of, 252.
PRALAMBHA, descendant of Naraka, king of Assam, 272.
PRÁNA NÁRÁYAṆA, ? = Bhíma Náráyaṇa of Koch Bihár, 307
PRASIDDHA NÁRÁYAṆA KUAR, Rája, owner of a Koch Vaṁśávali, 268 note 1.
PRATÁPARUDRA DEVA, mentioned in inscription at Purí, 88.
PREMA PÁLA of Assam, 275.
Prithiráj Ráy'sá, genuineness of, 127.
PṚITHVÍDEVA, Kalachuri King of Chedí, coin of, 241 and ff.
PṚITHVÍDEVA I, Kalachurí King of Chedí, 240.
PṚITHVÍDEVA II, Kalachurí King of Chedí, 240.
PṚITHVÍDEVA III, Kalachurí King of Chedí, 240.
Purí, inscription at, 88.
Purushanáma, a MS. account of the Koch Kings of Assam, 268.
PURUSHOTTAMA DEVA, mentioned in inscription at Purí, 88
PUSHKARASÁRIN, information in Weber MSS. derived from, a contemporary of Buddha, 16.

Qissae Padmáwat, name of Persian poem, 128.

RÁDHÁ KÁNTA DEVA, Raja, family come from Karṇa Suvarṇa, 327.
RAFI'U'D-DAULAH, official date of accession, 262.
RAFI'U'D-DARAJÁT, official date of accesion of, 262.
RÁGHAVA CHAITANYA, 188 & ff.
RAGHU RÁI, son of S'íla Rái, rules country East of Sankosh, 292.
————, his death, 293 n.
————, inscription of, in Hayagriva temple, 296.
RÁI GOBIND, MUNSHÍ, author of *Tukfatu'l qulub*, 128.
RÁI GUṆÁBHIRÁM BARUÁ, author of *Asámburanji*, 268 note 1.
RÁJAŚEKHARA, quoted by Jalhana, 215.
Rájavaṁśís are Koches who adopted Hinduism, 285.
RÁJÍ ḤÁMID SHÁH, Musalmán Saint, 152, 153.
RÁJÚ QATTÁL, Musalmán Saint, 153
RÁJYA PÁLA, 277 n.
Raktaviṭi, the monastery of Redlands, = Raṅgamaṭi, 319.
RÁMA NÁRÁYAṆA son of Viśva Siṁha, 286.
Ramamma of Ceylon Historians, = Oṛissá, 324.
RÁMA PÁLA, 276.
RÁMACHANDRA, son of Viśva Siṁha, 286.
Raṅgamáṭí described by Wilford, 328
————, once called Kusumapurí, 324.
————, destroyed by an expedition from Ceylon, 324.
Ráshṭrakúṭa family, 311.
Ratanpur, ancient capital of Chedí dynasty, 242.
RATNARÁJÁ I, Kalachurí King of Chedí, 240.
Ratan Chand, Díwán of Farrukhsiyár, first adopted system of farming mints 55.
RATNADEVA, Kalachurí King of Chedí, coin of, 241 & ff
RATNADEVA II, Kalachurí King of Chedí, 240.
RATNADEVA III, Kalachurí King of Chedí, 240.
RATNA SENA, King of Chitaur, 164 & ff.
RÁYA-MUKUṬA, author of *Pada-chandriká*, quotes *Jánakí haraṇa*, 215.
RICANETE, a Capuchin Missionary in Nepal, 41 note 3.
Rikábí, a kind of rupee, 58.
ṚISHABHA NÁTHA, Jaina Tirthaṁkára, image of, consecrated at Hastikuṇḍí, (A. D. 997), 310.
Ṛitus, description of the six, 181.
Ríwá, rupees of, 65, 67.
Roads in Assam, 279, 283, 286, 287.
Rohtás, coin of Jahángir, struck at, 244.
RUKMIṆÍ, carried off by Kṛishṇa from Assam, 272.
RUKNU'D-DÍN ABÚ'L-FATḤ MA'ÁSIR, Musalmán Saint, 150.
Rupee coinage under East India Co., 80.

Sacrifices, human by Nara Náráyaṇa of Assam, 291.
ṢADRU'D-DIN 'Arif' Musalmán Saint, 154.
Ságar, East India Co.'s coinage in, 75, 76, 79.
SALÁR KHÁDIM, a friend of Malik Muḥammad, 158.
SALONE SIṄGH, a friend of Malik Muḥammad, 129, 155.
Samataṭa = the Ganges delta, 316.
SAMBHOTA elaborates U-chan character, 6.
Saṁpuṭodbhava, MS. of, 252.
SAMUDRA GUPTA, letter *m'* on coins of, 4.

SAMUDRA NÁRÁYAṆA, Koch Rájá, 268.
Samudras, the seven, 104 note, 168.
Saṅgíta-ratnákara, MS. of, 252.
S'ÁNTIBHADRA or S'ÁNTYÁCHÁRYA, a Jaina Saint, consecrated an image at Hastikuṇḍi, 310.
Sarvatobhadrayantra, by Bháskara, 229.
S'AŚÁṄKA, ? belonged to line of Ádiśúra, 323.
—— — suggested reference to him by Abú'l-faẓl, 323.
SCHULTZ, contributes to the *Sprachmeister*, 47.
——— on Indian alphabets, 46.
——— writes a Hindústání Grammar, 47.
SCOTT's plan of old Fort William, 106.
Seasons, description of the six, 181.
Seendochee character, 5.
SENA dynasty, conquest of Kámarúpa by, 277.
SHAHABU'D-DÍN, Musalmán Saint, 154.
Sháhábád Ḳanauj Mint town of Mughal Emperors, 264.
SHÁH JAHÁN, coin of, 245.
Shamshersháhí pice, 66.
SHAMSU'D-DÍN MUẒAFFAR SHÁH, coin of, 238.
SHAMSU'D-DÍN YÚSAF SHÁH, coins of, 235 and ff.
SHASHATDHAR of Abú'l Faẓl ? = S'aśáṅka, 323.
Shaṭ ṛitu, 181.
SHER SHÁH, coin of, 244.
——— patron of Malik Muḥammad, 128, 144.
SHUJÁ'UD-DAULAH, in charge of Benares mint, (1754), 55.
SHUKL GOSAIṄ, Musalmán name of S'ukladhvaja, 295 *n*.
Siberia, explored by Messerschmid, 45.
Siddhanta S'íromaṇi by Bháskara, (1150). 224 and ff.
Sikka rupee of Lucknow, 64.
S'ÍLARÁÍ see S'ukladhvaja, 289.
——— conquers Hiḍamba or Cachar, 289.
——— conquers Jaintiá and Tipperah, 289.
——— conquers Sylhet, 290.
——— defeated by Pasha of Gauṛ, 290.
——— death of, 292.
——— inscription of, in Kámakhyá temple, 295.
SIṀHA PÁLA of Assam, 276.
Siṁhala-dvípa, 159 and ff.
SIMSON, Colin, plan for Fort William, 110.
SIMSON's plan of old Fort William, 106.
Singapore, supplied with coins from Bengal, 76.
S'IŚU, takes name of S'iva Siṁha, 282.
S'ishya-dhíṛiddhida Tantra, astronomical work by Lalla, 224.
S'ivapadma-saṁgraha Tantra, MS. of, 253
S'ivapanishad Tantra, MS. of, 253.
S'ivapadmottara Tantra, MS. of, 253.
S'ivapadma Tantra, MS. of, 250.
S'IVA SÍṀHA, Áhom king abdicates, 297 *n*.
S'IVA SIṀHA, see S'iśu, 285.
Si-yu-ki, Travels of Hieuen Tsiang, 315.
SMITH, Vincent Arthur, Article on Græco Roman influence on Civilization of Ancient India, 84 & ff.
S'oṇitapura = Tezpur in Assam, 273.
Sorcery, in Weber MSS., 22
Sprachmeister, by Fritz, (1748), 47.
S'rávastí, merchants from, visited Ceylon, 211.
SRIBAṄG, King in Assam, 275.
S'RÍ JÑÁNA or ATÍŚA, introduced reformed Buddhism into Tibet, 246.
SRONG TSAN GAMPO introduces writing in Tibet, 6.
Stotra in honour of Párvatí in Weber MSS., 20.
SUBÁHU, a descendant of Naraka, and King of Assam, 274.
——— succeeded Pála dynasty in Assam, 276.
SUBHÁV CHAND, farmer of Benares Mint (1757), 55.
S'uddhiratnákara by Chaṇḍeśvara, MS. of, 252.
S'UKLADHVAJA, son of Viśva S'iṁha, 286.
——— —— takes name of S'ílaráí, 287.
——— —— called Musalmáns Shukl Gosáiṅ, 295 *n*.
Súktimuktávalí by Jalhana, 215.
SUMATI, King of Assam, after Pálas, 276.
SUPARUÁ, last King of Naraka's line in Assam, 274.
SU PÁLA of Assam, 276 and *n*.
SURA SIṀHA, son of Viśva Siṁha, 286.
SUR'JÁ a Wrestler, 190, 193, 204.
SÚRYA, son of Viśva Siṁha, 286.
SÚRYA HARI GAṆAKA, author of the Koch *Vaṁśávalí*, 268.
SÚRYA NÁRÁYAṆA, of Darraṅg, 308.
SÚRYÁCHÁRYA, composer of Bíjapur inscription, 310.
Súryasiddhánta, errors of, corrected by Bháskara, 229.
Súryavaṁśa, Uriyá dynasty, 88.
SVARGA NÁRÁYAṆA, Áhom King, assists Bali Náráyaṇa aginst Musalmáns, 293.
S'YÁMA PÁLA of Assam, 276 and *n*.
Sylhet, conquered by S'ilaráí, 290.

Th in Central Asian Nágarí, 4.
Támluk = Támralipti, 211.

Támralipti, ancient port for Ceylon, 211.
Tátkálika motion of a planet, 276.
Tezpur = ancient S'oṇitapura, 273.
Thesaurus epistolicus Lacrozianus, 42.
Thisroṅ Deu-tsan, in reign of, Lantsha characters introduced to Tibet, 6.
Thon-mi, son of Anu learns, the S'abda Vidyá, 6.
Thumká Goharsháhí, a kind of rupee, 57
Thurston, Edgar, Article on East India Company Coinage, 52.
Tibetan alphabet, described by Bayer, (1729), 46.
Tibetan inscription deciphered by Bayer, (1728), 45.
Tipperah, conquered by S'ilarái, 289.
Tirsoolee = Triśúlí, q. v.
Tripurí, ancient capital, of Chedí dynasty, 242.
Triśúlí rupee, 57.
Tukfatu'l qulúb, N. of Persian romance, 128.
Turbuk invades Assam, (1506), 280.
Twelve, a favourite numbers for Councillers, &c., 282.

U-chan characters of Tibet, 6.
Udayapura, the seat of the Pálas of Raṅgpur, 278.
'Umar, second Caliph. 143, 147.
Umá-maheśvara-saṁváda Tantra, MS. of, 253.
Ushá, came from S'oṇitapura, in Assam, 273.
'Uṣmán, third Caliph 143, 144.
Uttarottara Tantra, MS. of, 253.

Váchpa, monastery of, 316.
Vákpati Muñja, Rájá of Málava, (1031-1050, V. S.), 311.
Vajraḍák tantra, MS. of, 252
Vajrabandhíyás, name of a sect, 320.
Vajradatta, son of Naraka, 271.
Vák Pála, 277 *n*.
Vaṁśávali, a MS., narrative of the Koch Kings of Assam, 268.
Vanamála, descendant of Naraka, King of Assam, 272.
Varman, or Barman, a Kshattriya title in Assam, 274.
Vásanábháshya, Comm. on *Siddhánta S'iromaṇi*, 229.
Váśibhá, ? = Váchpá, 316, 317.
Vaśishṭha, curses Naraka and Kámákhyá, 271.
Vasudeva, did not use Gandharian character on his coins, 85.
Vidagdha, king of Hastikuṇḍí, of Ráshṭrakúṭa family, (date 937 V. S.), 311.
Vigraha Pála, 276.
Vigraha Pála I., 277 *n*.
Vighaha Pála II., 277 *n*.
Vigraha Pála III., 277 *n*.
Vigraharája, a Cháhamána-rájá (Harsha and Bíjapur inscriptions), 311.
Víjapura, birth-place of Bháskara, 224.
Vijayanagara, town of Paríkshit, 293.
Vijaya Sena, defeated Nánya Deva, Karṇáṭaka, of Nepál, 251.
—————, conquered Gauḍa, Kámarúpa, and Kaliṅga, 277.
Vijita Náráyaṇa, succeeds Paríkshit in Koch Hájo, 307.
Vikramakála 201, note 3.
Víkramáditya, quoted as generous, 149.
Víryavanta, Rájá of Khairan, 289.
Viśva Siṁha succeeds Chandana, (1524), 283 *n*.
—————, date of, 304.
—————, found Koch dynasty of Kámarúpa, 285.
—————, see Bisu, 285.
Vṛihatkathá, MS. of new Sanskrit translation of, described, 254.
Vṛishaketu, son of Viśva Siṁha, 286.

Waddell, Dr., identifies Karṇa Suvarṇa, with Kañchannagar, 315, 326 and ff.
'Wartic' = Telugu, 44.
Wartu character of Tibet. Its resemblance to Central Asian Nágarí, 5, 6.
Weber, Rev F., description of MSS. sent by him to Society, 1 and ff.
Weber MSS., description of, 1 and ff. Age of, 8.
Wilford's account of Raṅgamáṭí, 328.
Well's plan of Fort William, 111.
Wells, Lt., in charge of construction of Fort William, 106-8.
White blood in a Bráhman, 286 *n*.
Wilkins, David, 1714, compiles translations of the Lord's Prayer, 42.
Wilson, C. R., Article on the Topography of old Fort William, 104 and ff.

'Xaca,' an Indian reformer, (?) Sákya Muni, 43.

Y, biannulate, form of, 8.
Y, tridentate, form of 7, 8.
Yoginí Tantra gives a history of Kámarúpa, 268 note.
Yúsaf Malik, a friend of Malik Muḥammad, 128, 155.

Zafarábád, mint town of Mughal Emperors, 264
Ziegenbalg, correspondence with La Croze, 43.
'Ziglesic,' a South Indian language, 44.
Ziyáud-dín 'Ibrat, author, 128.
Zú'l-qarnain, title of Alexander the Great, 145 note.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

VOL. LXII.

PART II. (NATURAL HISTORY, &c.)

(Nos. I TO IV.—1893.)

WITH INDEX

EDITED BY THE

NATURAL HISTORY SECRETARY.

> "It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish, if such communications shall be long intermitted; and it will die away, if they shall entirely cease." SIR WM. JONES.

CALCUTTA:
PRINTED AT THE BAPTIST MISSION PRESS,
AND PUBLISHED BY THE
ASIATIC SOCIETY, 57, PARK STREET.
1893.

LIST OF CONTRIBUTORS.

Page

ALCOCK, A. ;—*On some Newly-recorded Corals from the Indian Seas (Plate V.)* 138

————*On some* Actiniaria *from the Indian Seas* 151

————*Natural History Notes from H. M. Indian Marine Survey Steamer, 'Investigator,' Commander C. F. Oldham, R. N., Commanding.* Series II., No. 9. *An Account of the Deep Sea Collection made during the Season of* 1892–93. *(Plates VIII. and IX.)* 169

HEINIG, R. L. ;—*Blind Root-suckers of the Sunderbans (Plate VI.)* 158

HOLLAND, THOMAS H. ;—*The Petrology of Job Charnock's Tombstone* 162

————*On a slab of Chinese Agglomerate lava bearing a Chinese Inscription discovered in St. John's Churchyard, Calcutta. (Plate VII.)* 164

KING, GEORGE. ;—*Materials for a Flora of the Malayan Peninsula, No. V.* 87

————*Ditto No. VI.* 189

————*On some Indian Species of Canarium (Plates X to XIII.)* 184

NICÉVILLE, LIONEL DE ;—*On* Erites, *an Oriental genus of Satyrid Butterflies* 1

PRAIN, D. ;—*Two species of* Pedicularis. *(Plates I. and II.)* 7

————Noviciæ Indicæ VI. *A review of the genus* Colquhounia 30

————*On the Flora of* Narcondam *and* Barren Island *(Plates III. and IV.)* 39

————*Note on some methods of preparing botanical specimens, communicating Memoranda by* Messrs. C. Maries *and* R. Pantling 153

WATERHOUSE, J. ;—*Some observations of the Electrical action of Light upon Silver and its Haloid Compounds* 10

Dates of Issue. Part II, 1893.

No. I.—Containing pp. 1–38, with Plates I. and II. was issued on June 3rd, 1893.

No. II.—Containing pp. 39–150, with Plates III. IV. and V. was issued on August 12th, 1893.

No. III.—Containing pp. 151–168, with Plates VI. and VII. was issued on November 27th, 1893.

No. IV.—Containing pp. 169–262, with Plates VIII. IX. X. XI. XII. and XIII. was issued on March 6th, 1894.

LIST OF PLATES.

No. I.—*Pedicularis diffusa*, Prain.
No. II.— ,, *flaccida*, ,,
No. III.—Sketch Map of the Andaman Sea.
No. IV.— ,, ,, ,, ,, ,, Group.
No. V.—Corals from the Indian Seas.
No. VI.—Blind Root-suckers of the Sunderbans.
No. VII.—Quartz in Chinese Acid Rocks.
No. VIII.—Indian Echinoderms and Corals.
No. IX.— ,, Deep sea fishes.
No. X.—*Canarium bengalense*, Roxb.
No. XI.— ,, *strictum*, ,,
No. XII.— ,, *sikkimense*, King.
No. XIII.— ,, *reziniferum*, Brace.

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JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part I.—HISTORY, LITERATURE, &c.

No. I.—1893.

The Weber MSS.—Another collection of ancient manuscripts from Central Asia.—By DR. A. F. RUDOLF HOERNLE.

(With four Plates.)

In July last I received from the Reverend F. Weber, Moravian Missionary in Leh in Ladak, a small packet, containing ancient manuscripts.

Regarding the circumstances under which the manuscripts were discovered, and given to Mr. Weber, the latter in two letters, dated the 21st June and 29th July last, gives me the following information. They were found in the neighbourhood of a place called Kugiar, in a "house" which, apparently, since times immemorial had been ruined and buried. An Afghan merchant, hoping to discover buried treasure, with much trouble undertook the excavation of the "house." He found, however, only the bodies of some "cows," which on the first contact crumbled into dust. At the same time he found also the manuscripts. As Mr. Weber is known to the people to be a collector of Tibetan curiosities, the manuscripts were taken to him by a person who had received them from the finder. He was also shown an "Urdû" letter from the latter, giving the above account of his exploration, but not knowing "Urdû," Mr. Weber could not read the letter himself.

It would have been satisfactory to learn something more accurate about the identity of the so-called "house" in which, and the "cows" with which the manuscripts are said to have been found. But, on enquiry, Mr. Weber wrote me that he was unable to obtain any further information.

The place Kugiar will be found on any good map of Central Asia at 77° 12′ long. and 37° 25′ lat., about 60 miles south of Yarkand, at an altitude of 6450′. A straight line, drawn from Leh to Yarkand, very nearly passes through Kugiar; it is a little to the left of that line, and lies just within the borders of the Chinese territory.

I found the manuscripts enclosed, after the fashion of Indian manuscripts, between two pieces of wooden boards. These are of unequal size, one measuring 9½ by 2¾ inches, the other 7¼ by 2½ inches. They are, each, pierced by one hole, which is not in the middle of the board, but towards one side; in the larger board it is at a distance of 2½″, in the smaller at 1½″, from its narrow margin. Corresponding holes, on one side only, are in all the leaves of the manuscripts. This one-sided position of the string-hole is also observable in the Bower Manuscripts, and it appears to be a peculiarity of Central Asian manuscripts. I do not remember ever having observed it in any Indian manuscript. These have either one string-hole in the middle of the leaf, or they have two holes, one toward either narrow margin. Facsimiles of leaves with one hole are given in Dr. Mitra's *Sanskrit Notices*, and such of leaves with two holes, in Mr. Bendall's Catalogue of *Buddhist Sanskrit MSS.* The famous Horiuzi Manuscript, which originally came from India, has two holes, as may be seen from the facsimiles published by Prof. Bühler in the *Anecdota Oxoniensia*, Vol. I, Part III. On the other hand, the facsimile of the Central Asian manuscript, published by Mr. S. Oldenburg, in the Records of the Oriental Transactions of the Imperial Russian Archæological Society, Vol. VII, p. 81, 82, shows the peculiar one-sided hole. This practice of using an one-sided hole, therefore, would seem to be a mark by which a manuscript may be distinguished as coming from Central Asia. Another point to be noted is, that, like the Bower MSS., the Weber Manuscripts also are of the oblong shape, usual to Indian manuscripts, as distinguished from the square shaped Kashmirian. The square shape, indeed, appears to be an exceptional peculiarity of the Kashmirian manuscripts. All others, Indian, Nepalese, Tibetan and Central Asian are of an oblong shape.

On examining the Weber Manuscripts, I found that they formed a collection of fragments of nine (or possibly eleven) different manuscripts.

These are fragmentary in two ways. In the first place, not one of them is complete, a more or less large number of leaves being wanting both at the beginning and at the end. Secondly, every leaf is mutilated on the right or left or on both sides. On the other hand, they are, as a rule, perfect at the top and bottom. The following is a list of leaves of the several parts composing the manuscripts:—

Part	I,	consisting of	9	leaves.
„	II	„ „	7	„
„	III	„ „	6	„
„	IV	„ „	1	„
„	V	„ „	8	„
„	VI	„ „	5	„
„	VII	„ „	7	„
„	VIII	„ „	8	„
„	IX	„ „	25	„

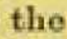
Nine Parts consisting of 76 leaves.

All the nine manuscripts are written on paper. Their paper is of differing qualities. In the main there are two kinds: one kind is thick, soft, flexible and white; it is so soft indeed, that its surface is apt to fret, and thus to injure the writing. The other kind is thin, hard and stiff, and of a more or less brownish colour. No. IX (Central Asian) has the softest and whitest texture. Also soft, but less white is the paper of Nos. 1 and 2 (Indian) and Nos. 6 and 7 (Central Asian). Harder and darker is the paper of Nos. 3 and 4 (Indian) and No. 5 (Central Asian). Distinctly hard and brown is the paper of No. VIII (Central Asian). The manuscripts, written in Central Asian characters, therefore, are inscribed on paper of the greatest variety, from the whitest and softest to the stiffest and darkest.

The paper, by appearance and touch, appears to me to be of the kind, commonly known as Nepalese, which is manufactured from several varieties of the Daphne plant. Dr. George King, the Director of the Botanical Gardens, has been good enough to examine the paper, and agrees with me that probably it is paper "made of the fibres of *Daphne papyracea*, or of *Edgeworthia Gardneri*, which are still used as raw material for paper-making in the Himâlayas." The better description of paper is made of fibres of *Edgeworthia Gardneri*. A very full account of this so-called Nepalese paper, its material and manufacture, will be found in Dr. Watt's *Dictionary of Economic Products of India*, Vol. III, p. 19, where also references to other sources of information are given.

For the purpose of being inscribed this paper appears to have been specially prepared with some kind of sizing, probably made of white arsenic. On the leaves of some of the manuscripts this size forms a thick glazed coat on which the letters are traced. Occasionally this glazed coat has peeled off, in which case the letters which it bore have disappeared with it. This is particularly the case with Part V, and may be seen on Plate II, fig. 1. In the case of Part IX, the coat, apparently under the influence of damp, has caused the leaves to stick together, and thus extensive damage has been done, as may be seen from figures 3–5 on Plate III.

A very striking peculiarity of the Weber Manuscripts is, that they are written in two quite distinct types of written characters. One of them—that in which Parts I, II, III and IV are written—is the well-known Indian character of the North-Western Gupta variety, being the same type (though a different sub-variety) as that used in the Bower MSS. This type of character is sufficiently well-known, and I need not say anything more about it here.

The other type of characters, used in Parts V–IX, is what I may call the Central Asian Nâgarî. It is a peculiar angular and slanting form of the Indian Nâgarî characters. On the whole the several Parts exhibit these characters in a variety of handwritings, though the essential type of the characters is the same. There is, however, a distinct variety, not merely of handwriting, but of type, noticeable between the characters used in Parts V–VIII and in Part IX. The test letters are the dental *th* and *dh*. In Part IX their shape is angular and squarish, *th* and *dh*, while in Parts V–VIII it is round,  *th* and *dh*. (See Plate IV.) For the purpose of comparing these two varieties of the Central Asian Nâgarî, Parts VII and IX (Plate II, fig. 6 and Plate III, figs. 3–5) are the best, because in their general style of handwriting they most nearly resemble one another. In the sequel, I shall refer to these two varieties as the round and the square varieties of the Central Asian Nâgarî.

I may here refer to a few other peculiarities of the Central Asian alphabet. Firstly, the curious form of the super-scribed vowel *ĕ*, with its curve turned to the right. Secondly, the curious form of the letter *m*. I have observed this form, in a few rare cases, on gold coins of Samudra Gupta. It has, clearly, grown out of the angular Indo-Scythian form of *m*; and its origination would fall in the early time of the Gupta period (Samudra Gupta 380–395 A.D.). The series of changes would be these , , , , all of these forms being represented on Gupta coins, and the last being the parent of the Central Asian form. Thirdly, the curious resemblance between the forms of *t* and *n*. They can only be distinguished by the fact, that the right-hand angle of *n* is more decidedly acute-angled. Fourthly, the curious symbol of a double dot over letters,—in fact a double anusvâra. It may be seen frequently in Mr. Oldenburg's Kashgar manuscript. In the Weber Manuscripts, it occurs only in Part IX, which, as above remarked, is distinguished by being written in the square variety of the Central Asian Nâgarî. It is, however, not so much the mark of a particular variety of characters, as of a particular language, and its exact power I do not know. Part IX is not written in Sanskrit, nor have I met with the double dot in any Sanskrit text, except once. On the smaller of the two wooden boards, three lines are inscribed in Central Asian characters. The board probably belongs to the work contained in Part VII, which treats of a Buddhistic charm, the lines are written in Sanskrit and run as follows :—

[*namô*]— *vidyâdharasya*—*dakshiṇê hastê* — *maṇi dhârayitavyaṁ* — *api cha*
[*pûrṇa-*]*râtr-ôvavustêna* — *suchi-snâtêna* — *su-vastra-prâv̈ṛitêna sâdhayivya*
[.]*ê siddhi* ॥

The words in brackets are broken off and have been conjecturally supplied. The meaning is : "Salutation to the Vidyâdhara ! Let the jewel be placed in the right hand ; then having fasted the whole night, washed clean, and put on fresh garments, success will be secured by me."[1]

Here there is the double anusvâra over the akshara *vṛi* of *prâvṛitêna*. But what it is there intended to signify, I do not know. In Part IX, it is occasionally found on Sanskrit words, thus *mañchaṁshṭhaṁ*, which is a mis-spelling for *mañjishṭhâ*. Here it may possibly mark a modification in the sound of the vowels ; but its real power is obscure.

I add a table of the Central Asian alphabet, showing the forms of single as well as compound letters. See Plate IV. They are nearly all excerpted from the leaves shown in my Plates I to III. In this table are also shown the ancient numeral figures. They are found in several of the manuscripts ; *viz.*, Parts I, II, IV, VI.

The Central Asian Nâgarî has a curious resemblance to the so-called "Wartu" characters of the Tibetans. In this Journal, for 1888, Vol. LVII, will be found two plates (I and II) showing these "Wartu" characters. It belongs to a paper, published by Bâbû S. C. Das, on *the Sacred and Ornamental Characters of Tibet* (*ibid.*, p. 41). The resemblance, however, is still more striking to certain characters, shown on Plate I, in the *Asiatic Researches*, Vol. XVI (for 1828), and there designated respectively as *Khacheehee*, *Gramtsodee*, *Seendoohee*, and *Pookangkee*. The plate seems to have been prepared by Mr. Hodgson from "a vast number of manuscripts, great and small fragments," as specimens of "*Bhotiya*" (*i. e.*, Tibetan) penmanship.[2]

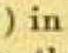
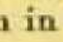
---

[1] Perhaps *sâdhayishyatê* should be read for *sâdhayivya*[.]*ê*, or *sâdhayitavyâ mê*. With *uvavustêna* compare the Pâli *upavuttha*.

[2] The letters on the Plate would seem to be intended for facsimiles, but the accuracy of the copy is not above suspicion. There are certainly some obvious mistakes in the identification of the letters ; thus the third group (from the left) in the last line, is not *p*, *ph*, *b*, *bh*, *m*, but *t*, *th*, *d*, *dh*, *n*. Again the third letter in the third line is not *pa*, but *pâ*.

The Tibetan tradition with regard to the "Wartu" characters is rather uncertain. In the paper, above referred to, Bâbû S. C. Das says, that the "Wartu" characters were introduced into Tibet by Sambhoṭa (or Thon-mi, the son of Anu) from Magadha in North-Eastern India, about 630–650 A. D. Since then he has been re-examining the traditions of Tibet on this point, and he now informs me that the "Wartu" characters were rather introduced from the North-Western extremity of India, namely from Kâshmîr, called in Tibetan *Kha-che*. He has supplied me with the following passage from the Bu-ston Chos byuñ (fl. 138): "He (*i. e.*, King Srong Tsan Gampo, 630 A. D.) ascended the throne at the age of 18. He brought the border chieftains under subjection. He made presents to them, (and) read letters (sent by them). Before that (time) there was no written language in Tibet. He sent Thon-mi, son of Anu, with sixteen attendants to learn the letters. He learnt from Pandit Deva-vid Siṁha the S'abda Vidyâ. He designed 30 letters, adapting them to the Tibetan language. He based the four fundamental vowels, called *Âli*, (i. e., *i*, *e*, *o*, *u*) on *a*. In form these letters (vowels and consonants) resembled the characters of Khache. This was done at the fort of Maru in Lhassa. He wrote eight grammatical works on the orthography and syntax of the Tibetan Grammar." The Bâbû also informs me, that in later days the country of Liyul or Khoten was included in the general name of Khache; and further that the letters which were brought from India, through Nepal, were the so-called Lantsha (see Plate VIII in Journal, vol. LVII), introduced in the reign of Thisroñ Deu-tsan.

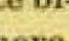
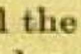
Here the following points may be noted: In the first place, the 34 original letters of Tibet (*i. e.*, 29 consonants and 5 vowels) elaborated by Sambhoṭa, are shown on Plate II(*a*) in Bâbû S. Ch. Das' paper. They are the so-called *U-chan* or "headed" characters. It will be noticed that among them "the four fundamental vowels" are certainly adaptations of the form of the vowel *a*. This, so far, bears out the tradition above quoted from the Bustan. But, for the rest, the letters show no particular resemblance to the "Wartu" or "Khache" characters, any more than to any other Indian system of writing (*e. g.*, the Gupta or Lantsha.) Possibly this may be put down to the fact, that Sambhoṭa may have modified the shapes of the letters he adopted; or it may be due to subsequent alterations, the table not showing the exact shape the letters received at the hands of Sambhoṭa, but such as they assumed in the course of time.

But, secondly, it is noteworthy that the letter *y* in Sambhoṭa's alphabet shows the ancient tri-dentate shape of that letter. In the table of "Wartu" characters, on the other hand, that letter shows its modern (square) form. It is clear, therefore, that the "Wartu" letters, from which Sambhoṭa copied his own, cannot have been precisely the same as those exhibited in Bâbû S. Ch. Das' table. Now there is an unmistakable similarity of the letters shown in the table of the *Asiatic Researches*, on the one hand, with the Bâbû's "Wartu" characters, and on the other, with the Central Asian characters in the Weber Manuscripts. In the table there is a series of *Khacheehee* letters, that is, clearly, letters of *Khache* (Central Asia.) These, therefore, should be the letters, from which Sambhoṭa adapted his alphabet. And, as a matter of fact, it will be found that the letter *y* shows in that table its old tri-dentate form. But further, in that table the letter *y* appears in three different forms: first, in the distinctly tri-dentate form () in the second line, then in an intermediate bi-annulate form () in the third line, and lastly in the (practically) modern square form in the fourth line. The last of these three forms, the modern one, is never found in any portion of our manuscripts. The form in which it is usually occurs in them, is the intermediate, bi-annulate one. In the most ancient tri-dentate form it only occurs, optionally, in Part V of the Weber Manuscripts. With regard to the Tibetan alphabet, the evidence seems to point to this conclusion, that Sambhoṭa had before him a "Khache" alphabet, similar to those shown in the Plate of the *Asiatic Researches*, but sufficiently ancient, to still show uniformly the ancient tri-dentate form of the letter *y*, which, in its turn, explains the presence of that ancient form in the current Tibetan alphabet. The characters he had before him may have been something similar to those seen in Part V of the Weber Manuscripts. On the other hand, the "Wartu" letters, shown in Bâbû S. C. Das' plate had for their prototype a somewhat later "Khache" alphabet,—one which had already adopted the modern square form of the letter *y*.

The whole of the Weber Manuscripts are written in the Sanskrit language, of more or less grammatical purity, except Part IX. This is written in the square variety of the Central Asian Nâgarî, and in a language which to me is unintelligible. The strange ligatures that occur in it, such as *lkkh*, *tsts*, *yl*, *shsh*, *pts*, *bhb*, *ññ*, *ys*, etc., are foreign to Sanskrit or any Sanskritic language that I know of; yet undoubted Sanskrit words do occur numerously interspersed in the text. Such are *aśvakânda* and *aśvagandha*, *sirisha* (Skr. *śirîsha*)*-pushpa*, *pṛiyaṅgu*, *punarnava*, *mañchaṁshthaṁ* (Skr. *mañjishṭhâ*), *sârava* (Skr. *śârivâ*), *mêdha* and *mahâmêdha* (Skr. *mêda* and *mahâmêda*), *prapuṇḍarikha* or *prapuntarikha* (both spellings occur for Skr. *prapauṇḍarîka*), *kaṭu-rôhiṇi*, *kâkôrî* and *kshîra-kâkôri*, *dêvadâru*, etc. It will be noticed that most of the names are not correctly spelled; unaspirates being exchanged with aspirates, sonants with surds, cerebrals with dentals, etc. But there can be no shadow of doubt as to the identity of the words. They are Sanskrit names of medicinal plants. I have not yet been able to give to the subject any thorough examination, but I suspect that we have in Part IX a medical treatise written in some Mongolian (Tibetan) or Turkî language, treating of Indian medicine, and hence using Sanskrit medical terms.

The curious circumstance, however, with regard to this Part IX is that, both with reference to the characters (square variety) and the language, it clearly belongs to the same class of manuscripts as the Kashgar MS., published by Mr. Oldenburg. Of the latter manuscript I shall give some account at the end of this paper.

On the age of the Weber MSS., I am not able to give such a definite opinion as on that of the Bower MSS., though I am not disposed to believe that any portion of it can be referred to a date later than the 7th century A. D. In the Indian portions of the manuscript (Parts I to IV) no other than the old tri-dentate form of *y* ever occurs. On this ground these portions should be of the same date as the Bower MSS., *i. e.*, belong to the 5th century A. D. In some points they are even more antique than the Bower MSS. Thus the compound *r*, preceding another consonant, is uniformly written level with the line of writing (never above it, like the vowel marks). The consonant *p* has also preserved a more ancient shape.

The Central Asian portions of the Weber Manuscripts show occasionally in Part V, the old tri-dentate form  of *y*, and otherwise throughout the intermediate bi-annulate form . No trace of the modern square form is seen anywhere. I call the bi-annulate form "intermediate," not because it presents a stage of development intermediate between the old tri-dentate and the modern square forms, but simply because it is clearly a "current" form grown out of the older tri-dentate. It seems to me doubtful whether it was ever superseded by the later Indian "current" square form. On the other hand, it is so easily formed out of the older tri-dentate form, that it may have been and probably was nearly contemporaneous with it. I am disposed to believe, that the Gupta *ya* (the old tri-dentate form) as it was carried from Kashmîr into the more northern and north-eastern parts (Kashgar, Yarkand, Khoten) of Central Asia, assumed and always retained the bi-annulate form, while in the more south-eastern parts (Western Tibet) it retained at first its tri-dentate form and was afterwards gradually changed into the modern (Indian) square form. When Sambhoṭa went to "Khache" (Central Asia, *i. e.* Kashmîr, Liyul, Khotan) to bring thence the letters in 630-650 A. D., he evidently found the tri-dentate form in use in the particular part of the country which he visited. Towards the end of the 7th century and early in the 8th, Central Asia was overrun by the Muhammadan armies of the Khalifat, and this put an end to the Sanskrit culture of those regions. Hence our Central Asian manuscripts which still show evidences of a distinct Sanskrit culture cannot well be placed after that date.

I now proceed to describe the several parts of the Weber MSS. in detail :—

Part I. (See Plate I, fig. 1.) There are nine leaves, mutilated on the right-hand side. They measure 7½ by 2¼ inches, and have eight lines to the page, excepting the obverse of the 14th leaf, which has 9 lines. The leaves are consecutively numbered, from 7 to 15, in the old style of figures. The first six leaves and those after the fifteenth are wanting. The obverse of the 15th leaf is shown in Plate I, fig. 1. The number 15 (*i. e.*, the figure for 10, and below it the figure for 5) is seen on the left-hand margin. The page reads as follows :—

1, क्षत्रं चतुस्तारं गजविक्क्रमसंस्थितं पञ्चचत्वारिंशमुहूर्त्तयोगं मधुलाजाहारं वैश्यदैवत मद्ग
2, जिनक्षत्रं त्रितारं गोशीर्षसंस्थितं सप्तमुहूर्त्तयोगं वायुक्षाहा ब्रह्मायनीगोत्रेण θ ॥ श्र
रं
3, वमद्यसंस्थितं त्रिंशमुहूर्त्तयोगं पक्षिमांसाहारं विष्णुदेवतं ब्रह्मावर्णीगोत्रेण ९ ॥ इतो
4, पश्चिमद्वारीकाणि नक्षत्राणि ○ ॥ धनिष्ठानक्षत्रं चतुस्तारं शकुनसंस्थितं त्रिंश-
∝ [मुहूर्त्तयोगं
5, ƙ वतं कत्याय गोत्रेण ९ ॥ शतभिषा नक्षत्रं एकतारं तिलकसंस्थितं पञ्च-
नौ [दशमुहूर्त्त
6, दैवतं ताण्डायनीगोत्रेण θ≡ ॥ पूर्वभद्रपदा नक्षत्रं द्वितारं पताकसंस्थितं त्रिंशमह
7, बाभिहृदिदेवतं जातुकर्णीगोत्रेण θ५ ॥ उत्तरभद्रपदा नक्षत्रं द्वितारं पताकसंस्थित
8, गोमांसाहारं आर्यमाकल्पदेवतं हिरण्यायनीगोत्रेण θƙ ॥ रेवती नक्षत्रं एक

In the following Roman transliteration I have added, in straight brackets and italics, the missing portions, so far as it is possible to deduce them from the context and other parts of the manuscript. It will be seen that from 9 to 11 aksharas are missing in each line, which would occupy nearly two inches of the leaf. The original size of the leaf, therefore, must have been 9½ by 2¼ inches, that is, exactly the size of the larger of the two wooden boards. This circumstance would seem to prove that the larger board was one of the two covers of this particular manuscript.

1, kshatraṁ chatus-târaṁ gaja-vikkrama-saṁsthitaṁ pañcha-chatvâri[*ṁ*]śa-muhûrta-yôgaṁ madhu-lâj-âhâraṁ Vaiśya-daivata[*ṁ*] M[*au*]dga[*lâyanî-gôtrêṇa 19* ॥ *Abhi-*]

2, ji nakshatraṁ tri-târaṁ gô-śîrsha-saṁsthitaṁ sapta-mûhûrta-yôgaṁ vâyu-kraksh-âhâraṁ Brahmâyani-gôtrêṇa 20 ॥ S'ra[*vaṇô nakshatraṁ tri-târaṁ yu-*]

3, va-maddhya-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ pakshi-mâṁs-âhâraṁ Vikshṇu-dêvataṁ Brahmâvarṇi-gôtrêṇa 21 ॥ It=î[*mâni bhô Pushkarasâri sapta*]

4, paśchima-dvârîkâni nakshatrâṇi ॥ Dhanishṭhâ nakshatraṁ chatus-târaṁ śakuna-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ [. . *-âhâraṁ Vâsava-dai-*]

15 vataṁ Katyâyanî-gôtrêṇa 22 ॥ S'atabhishâ nakshatraṁ êka-târaṁ tilaka-saṁsthitaṁ pañchadaśa-muhûrta-[*yôgaṁ . . . -âhâraṁ Varuṇa-*]

6, daivataṁ Tâṇḍâyanî-gôtrêṇa 23 ॥ Pûrva-bhadrapadâ nakshatraṁ dvi-târaṁ patâkâ-saṁsthitaṁ triṁśa-m[*u*]h[*ûrta-yôgaṁ . . . . -âhâraṁ*]

7, Âbhivṛiddhi-daivataṁ Jâtukarṇi-gôtrêṇa 24 ॥ Uttaṁra-bhadrapadâ nakshatraṁ dvi-târaṁ patâkâ-saṁsthita[*ṁ pañcha-chatvâriṁśa-muhûrta-yôgaṁ*]

8, gô-mâṁs-âhâraṁ Âryam-âkalpa-daivataṁ Hiraṇyâyanî-gôtrêṇa 25 ॥ Rêvati nakshatraṁ êka[*-târaṁ . . -saṁsthitaṁ triṁśa-muhûrta-*]

Fifteenth Leaf : Reverse.

1, yôgaṁ guḍa-kaṁsâr-bhôjanaṁ[3] Pushya-daivataṁ Bhârgavân-gôtrêṇa 26 ॥ Aśvinî nakshatraṁ tṛi-târa[*ṁ . . -saṁsthitaṁ triṁśa-muhûrta-yôgaṁ ya-*]

2, kṛin-mâṁsa-bhôjanaṁ Gandharva-daivataṁ Aśvâyanî-gôtrêṇa 27 ॥ Bharaṇî nakshatraṁ tri-târaṁ bhaga-saṁ[*sthitaṁ triṁśa-muhûrta-yôgaṁ*]

3, taṇḍul-âhâraṁ Yama-daivatam (arthavaṁ)[4] Bhârgavî-gôtrêṇa 28 ॥ It=îmâni bhô Pushkarasârin=sapt=ôttara-dv[*ârikâni nakshatrâṇi* ॥ *Ity=êshâṁ*]

4, bhô Pushkarasârin ashṭâ-vîṁśatînâṁ nakshatrâṇâṁ katamâni nakshatrâṇi pañcha-chatvâriṁśa-muhû[*rtâni shaṭ tad-yathâ Rôhiṇî Punarva-*]

5, suḥ uttarâ Phalgunî Viśâkhâ uttar=Âshâḍhâ uttarâ Bhadrapadâ — pañcha nakshatrâṇi pañcha[*daśa-muhûrtâni tad=yathâ Ârdrâ*]

6, Aślêshâ Svâti Jyêsṭhâ S'atabhishâ êkâ Abhiji ashṭau muhûrta śêshâṇi triṁśa-muhûrtâni nakshatr[*âṇi pûrva-dvârikânâṁ*]

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[3] This was the original reading; by the interlinear insertion of the akshara *hâ* it is now changed to *guḍa-kaṁs-âhâra-bhôjanaṁ.*

[4] This word is inserted interlinearly, with a mark indicating the proper place where it should be read in the line.

7, nakshatrâṇâṁ Kirtikâ pûrvaṁ Aślêshâ paśchimâ dakshiṇa-dvârikânâṁ nakshatrâṇâṁ Maghâ pûrvaṁ Viśâkhâ paśchi[*mâ paśchima-dvârikânâṁ na-*]

8, kshatrâṇâṁ Anurâdhâ pûrvaṁ S'ravanaḥ paśchimaḥ uttara-dvârikânâṁ nakshatrâṇâṁ Dhanishṭhâ pûrvaṁ paśchimâ Bha[*raṇî . . . .*]

I may add the remainder of the remarks on the nakshatras from the preceding leaves 13 and 14:—

Thirteenth Leaf: Reverse.

1, katamê Vâtsâ Brâhma-châraṇaḥ Chhandôgâ katî Chhandôgânâṁ bhêdâḥ shaṭ katamê tad=yathâ gôdhû[. . . . .]

2 kapiṁjalêyâ atyâsanam=iti kiṁ-gôtrî mâtâ Pârâśarî—paṭhati bhavân=nakshatra-vaṁśam=atha kiṁ katha[*yatu mê tad=yathâ Kṛitikâ 1*]

3, Rôhiṇî 2 Mṛigaśiraḥ 3 Ârdrâ 4 Punarvasuḥ 5 Pushyaḥ 6 Aślêshâ 7 Maghâ 8 Pûrva-phalgu[*nî 9 Uttara-phalgunî 10 Hastaḥ*]

4, 11 Chitrâ 12 Svâtiḥ 13 Aśâkhâ (*sic*) 14 Anurâdhâ 15 Jyêshṭhâ 16 Mûlaḥ 17 Pûrvâshâḍhâ [*18 Uttarâshâḍhâ 19 Abhiji*]

5, 20 S'ravaṇah 21 Dhanishṭhâ 22 S'atabhishâ 23 Pûrva-bhadrapadâ 24 Uttarâ-bhadrapadâ 25 Rê[*vatî 26 Aśvinî 27 Bhara-*]

6, ṇî 28 ity=êtâny=ashṭâvîṁśati nakshattrâṇi kati-târâṇi kiṁ-saṁsthânâni kati-muhûrtâni kiṁ-gôttrâṇi ki[*ṁ-bhôjanâni kiṁ-*]

7, daivatâni—Kṛitikâ nakshatraṁ shaṭ-târaṁ kshura-saṁsthânaṁ trîṁśa-mûhûrta-yôgaṁ dadhi-âhâraṁ Agni-daivatam=Agni[*vêśya-gôtrêṇa 1* ॥ *Rôhi-*]

8, ṇî nakshatraṁ pañcha-târaṁ śakaṭ-ôddhi-saṁsthânaṁ pañcha-chatvârîṁśa-muhûrta-yôgaṁ vṛisha-matsya-bhôjanaṁ prajâ[*pati-daivataṁ . . . -gôtrêṇa 2* ॥]

Fourteenth Leaf: Obverse.

1, Mṛigaśirasaṁ nakshatraṁ tri-târaṁ mṛiga-śirsha-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ mṛiga-matsya-bhôjanaṁ Sôma-d[*ai*]vata[*ṁ . . . . -gôtrêṇa 3* ॥ *Ârdrâ na-*]

2, kshatraṁ êka-târaṁ tilaka-saṁsthitaṁ pañchadaśa-muhûrta-yôgaṁ navanît-âhâraṁ Rudra-daivataṁ Hâritâyana-gô[*trêṇa 4* ॥ *Punarvasur=nakshatraṁ*]

3, dvi-târaṁ patâkâ-saṁsthitaṁ pañcha-chatvâriṁśa-yôgaṁ sarpimaṇḍ-âhâraṁ Âditya-daivataṁ Vaśishṭha-gôtrê[*ṇa 5* ॥ *Pushyô nakshatraṁ tri-tâ-*]

4, raṁ vardhamâna-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ madhv-âhâraṁ Bṛihaspati-daivataṁ Alabanêyavi-gôtrê[*ṇa 6* ॥ *Aślêshâ nakshatraṁ paṁ-*]

5, cha-tàraṁ akâśa-patâkâ-saṁsthitaṁ pañchadaśa-muhûrta-yôgaṁ matsa-yakṛi-bhôjanaṁ sarpi-dai[*vataṁ . . . . -gôtrêṇa 7* ǁ *I-*]

6, t=îmâni bhô Pushkarasâri sapta pûrva-dvârikâni nakshatrâṇi ǁ Maghâ nakshatraṁ pañcha-tàraṁ nadî-kraṁja-saṁsthi[*taṁ triṁśa-muhûrta-yôgaṁ . . -*]

7, bhôjanaṁ Pitṛi-dêvataṁ Piṅgâyanî-gôtrêṇa 8 ǁ Pûrva-phalgunî nakshatraṁ dvi-tàraṁ patàkâ-saṁsthitaṁ [*triṁśa-muhûrta-yôgaṁ . . -âhâraṁ*]

8, Bhaga-daivataṁ Gôtama-gôtrêṇa 9 ǁ Uttarâ phalgunî nakshatraṁ dvi-târaṁ patàkâ-saṁsthitaṁ paṁcha-chatvâriṁ[*śa-muhûrta-yôgaṁ . . -âhâraṁ*]

Fourteenth Leaf : Reverse.

1, Ârya-daivataṁ Kauśikî-gôtrêṇa 10 ǁ Hastô nakshatraṁ hasta-saṁsthitaṁ pañcha-târaṁ triṁśa-muhûrta-yôga[*ṁ . . . -âhâraṁ . . . -dai-*]

2, vataṁ Kâtyâyanî-gôtrêṇa 11 ǁ Chitrâ nakshatraṁ êka-târaṁ tilaka-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ mudga-[*bhôjanaṁ . . . -daivataṁ . . -*]

3, kî-gôtrêṇa 12 ǁ Svâtir=nakshatraṁ êka-taraṁ tilaka-saṁsthitaṁ pañchadaśa-muhûrta-yôgaṁ phal-âhâraṁ [*. . . -daivatam . . . -gô-*]

4, trêṇa 13 ǁ Viśâkhâ nakshatraṁ dvi-târaṁ vishâṇa-saṁsthitaṁ pañcha-chatvâriṁśa-muhûrta-yôgaṁ ti [*. . -âhâraṁ . . . -daivataṁ*]

5, Satkṛityàyanî-gôtrêṇa 14 ǁ It=îmâni bhô Pushkarasârin=sapta nakshatrâṇi dakshiṇa-dvârikâni ǁ [*Anurâdhâ nakshatraṁ . . -tâ-*]

6, raṁ ratna-sphaḍika-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ mâsha-sûpôdana-bhôjanaṁ Mîtra-daivatam Alaṁba[*nêyavî gôtrêṇa 15* ǁ]

7, Jyêshṭhâ nakhshatraṁ tṛi-târaṁ yuva-maddhya-saṁsthitaṁ pañchadaśa-muhûrta-yôgaṁ śâli-yav-âhâraṁ Indra-dêvataṁ Dîya . . -gôtrêṇa 16 ǁ [*Mûlô nakshatraṁ cha-*]

8, tus-târaṁ gaja-vikkrama-saṁsthitaṁ triṁśa-muhûrta-yôgaṁ nyagrôdha-kashây-âhâraṁ Âpa-daivataṁ Darpa-katyâyani-[*gotrêṇa 17* ǁ *Pûrvâshâḍhâ na-*]

9, kshatraṁ tri-târaṁ pula . . .-saṁsthitaṁ tṛiṁśa-muhûrta-yô[*gaṁ*] mûla-phal-âhâra[*ṁ*] Naṛiti-daivataṁ [. . . *-gôtrêṇa 18* ǁ *Uttarâshâḍhâ na-*]

It will be observed that the spelling and grammar is occasionally irregular. Thus we have a wrong quantity on fl. $13b^7$ *triṁśa* for *triṁśa* and *ibid.* and fl. $15a^3$ *mûhûrta* for *muhûrta*, fl. $14b^6$ *mîtra* for *mitra*, fl. $15b^4$ *chatvâriṁśa* and *viṁśatînâṁ*, fl. $15a^4$ (see plate) *dvârikâni* for *dvârikâni* ; *ṛi* for *ri* in fl. $14b^9$ *tṛiṁśa* for *triṁśa*, fl. $14b^7$ *tṛitâraṁ* for *tritâraṁ* ;

ṛr for *ṛi* on fl. $15b^7$ in *kṛrtikâ* for *kṛitikâ ;* *ḍ* for *ṭ* on fl. $14b^6$ in *sphaḍika*. Want of sandhi: fl. $13b^7$ *dadhi-âhâraṁ* for *dadhyâhâraṁ*. Blunder: fl $15a^7$ *uttaṁra* for *uttara ;* fl. $15a^3$ *vikshṇu* for *vishṇu ;* fl. $13b^4$ *aśâkhâ* for *viśâkhâ*, though these two forms may be synonyms; in the Abridged Petersburg Dictionary both forms are given as synonyms of a certain plant. Similarly fl. $14a^5$ *sarpi* 'serpent' for *sarpa*, fl. $15b^1$ *Bhârgavân* for *Bhârgavô*. Omission of final consonant in fl. $14a^5$ *yakṛi* for *yakṛit*, fl. $15a^2$ (see plate) and fl. $15b^6$ *abhiji* for *abhijit*. Anomalous construction in fl. $15b^6$ *êkâ abhiji ashṭau muhûrta*. I am not quite satisfied that I have read correctly the words *kraksha* fl. $15a^2$, *Brahmâvarṇi* fl. $15a^3$. In fl. $15a^2$ (see plate) there is a curious symbol above *sapta ;* and since on fl. $15b^6$ it is stated that *Abhijit* has eight (*ashṭa*) muhûrtas, I believe that the symbol is the numeral figure 8, intended as a correction. The *s* of *sapta* has not quite its proper shape; I believe the writer or revisor meant to alter *sapta* into *ashṭa*, but seeing his failure in altering the shape of *sa*, he abandoned his intention and over-wrote the figure 8. There are numerous traces to be met with of a revisor's work; thus in fl. $15a^2$ *krakshâhârâṁ* the *ra* was originally omitted and has been supplied interlinearly; similarly the syllable *nî* of *katyâyanî* in fl. $15a^5$. (See the Plate.)

The portion extracted by me, may be translated thus, observing the proper sequence of the leaves :—

(Leaf 13.) Who are they? They are the Vâtsas, Brahmachârins and Chhandôgas. How many are the divisions of the Chhandôgas? Six. Which are they? They are as follows :—Those whose food consists in (1) wheat, (2) ....., (3) ....., (4) ....., (5) ....., (6) francoline partridge.[5] To which gôtra does their mother belong? To Paṛâśara's. Has your honour any (particular) reading of the list of Nakshatras? Tell me! They are as follows :—1, Kṛitikâ, 2, Rôhiṇî, 3, Mṛigaśira, 4, Ârdrâ, 5, Punarvasu, 6, Pushya, 7, Âślêshâ, 8, Maghâ, 9, Pûrva-phalgunî, 10, Uttara-phalgunî, 11, Hasta, 12, Chitrâ, 13, Svâti 14, Aśâkhâ (Viśâkhâ), 15 Anurâdhâ, 16, Jyêshṭha, 17, Mûla, 18, Pûrvâshâḍhâ, 19 Uttarâshâḍhâ, 20 Abhiji, 21, S'ravaṇa, 22 Dhanishṭha, 23, S'atabhishâ, 24, Pûrvâ Bhadrapadâ, 25, Uttarâ Bhadrapadâ, 26, Rêvatî, 27, Aśvinî, 28, Bharaṇî. These twenty nakshatras—what are the numbers of their stars, what are their configurations, what are the numbers of their muhûrtas, what are their gôtras, what kinds of food may be taken under them, what are their daivatas?

The following part of the translation, I give in tabular form, for the sake of convenient reference.

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[5] *Atyâsanam* I take to be a mis-reading for *ity-âśanam* (=*aśanam*).

No.	Name.	Stars.	Configuration.	Muhûrta.	Food.	Daivata.	Gôtra.
1	Kṛitikâ	6	razor	30	curds	Agni	Agnivêśya.
2	Rôhiṇî	5	seat of a cart	45	beef and fish	Prajâpati	?
3	Mṛigaśira	3	deer's head	30	venison and fish	Sôma	?
4	Ârdrâ	1	mole	15	butter	Rudra	Hâritâyana.
5	Punarvasu	2	flag	45	froth of boiling butter	Âditya	Vaśishṭha.
6	Pushya	3	vardhamâna	30	honey	Vṛihaspati	Alabaṇêyavî.
7	Aślêshâ	5	flag in the air	15	fish and liver	Sarpa	?

These, oh Pushkarasâri, are the seven nakshatras that are situated in the East.

8	Maghâ	5	river-arbour	30	?	Pitṛi	Piṅgâyanî.
9	Pûrva-phalgunî	2	flag	30	?	Bhaga	Gôtama.
10	Uttara-phalgunî	2	flag	45	?	Ârya	Kauśikî.
11	Hasta	5	hand	30	?	?	Kâtyâyanî.
12	Chitrâ	1	mole	30	mudga-bean	?	?
13	Svâti	1	mole	15	fruit	?	?
14	Viśâkhâ	2	horn	45	?	?	Satkṛityâyanî.

These, oh Pushkarasârin, are the seven naksharas that are situated in the South.

15	Anurâdhâ	?	crystal	30	mess of mâsha-beans	Mitra	Alaṁbanêyavî.
16	Jyêshṭhâ	3	waist of a youth	15	rice and wheat	Indra	Dîya —.
17	Mûla	4	elephant's foot	30	infusion of Ficus Indica	Âpa	Darpa-katyâyanî.
18	Pûrvâshâḍhâ	3	?	30	roots and fruit	Naṛiti	?
19	Uttarâshâḍhâ	4	elephant's foot	45	honey and parched grain	Vaiśya	Maudgalâyanî.
20	Abhijit	3	cow's head	(8) 7	vâyu-kraksha (?)	*deest*	Brahmâyanî.
21	S'ravaṇa	3	waist of a youth	30	bird's flesh	Vishṇu	Brahmâvarṇî.

These, oh Pushkarasâri, are the seven nakshatras that are situated in the West.

22	Dhanishṭhâ	4	bird (kite)	30	?	Vâsava	Katyâyanî.
23	S'atabhishâ	1	mole	15	?	Varuṇa	Tâṇḍâyanî.
24	Pûrvâ Bhadrapadâ	2	flag	30	?	Âbhivṛiddhi	Jâtukarṇî.
25	Uttarâ Bhadrapadâ	2	flag	45	beef	Âryamâkalpa	Hiraṇyâyanî.
26	Rêvatî	1	?	30	consistent molasses	Pushya	Bhârgavân.
27	Aśvinî	3	?	30	liver and flesh	Gandharva	Aśvâyanî.
28	Bharaṇî	3	pudendum muliebre	30	rice	Yama	Bhârgavî.

These, oh Pushkarasârin, are the seven nakshatras that are situated in the North.

Of these twenty-eight nakshatras, oh Pushkarasârin, how many nakshatras occupy a period of 45 muhûrtas? Six; they are these:—Rohiṇî, Punarvasu, Uttarâ Phalgunî, Viśâkhâ, Uttarâshâḍhâ, Uttarâ Bhadrapadâ. Five nakshatras take up 15 muhûrtas, namely Ârdrâ, Aślêshâ, Svâti, Jyêshṭhâ, S'atabhishâ. One, Abhijit, occupies eight muhûrtas. The remainder are nakshatras occupying 30 muhûrtas. Of the nakshatras, situated in the East, Kṛitikâ is the first and Aślêshâ, the last (counting from East to West). Of the nakshatras, situated in the South, Maghâ is the first, and Viśâkhâ, the last. Of the nakshatras, situated in the West, Anurâdhâ is the first, and S'ravaṇa, the last. Of the nakshatras, situated in the North, Dhanishṭhâ is the first, and Bharaṇî, the last.

This work is clearly an astronomical treatise of a very ancient type. The most ancient astronomy of the Hindûs was based on the lunar zodiac, comprising 27 (or afterwards 28) asterisms, the so-called nakshatras, the series of which commenced with Kṛittikâ or the Pleiades, and ended with Aśvinî and Bharaṇî. This system obtained among them till the introduction of Greek astronomy into India, about the middle of the 2nd century A. D. (the time of Ptolemy). About that time the order of the nakshatra series, which was now no more in accordance with reality, was rectified, and the two last nakshatras were placed first, so that the series now commenced with Aśvinî (*i. e.*, β and γ in Aries). This new order is that found in all Indian astronomical works, subsequent to the Vedic period.

Further: the older series, beginning with Kṛittikâ, consisted originally only of 27 nakshatras. It was, apparently, only in the later stage of the Vedic period of the Brâhmaṇas and Sûtras, that a 28th nakshatra was added; this was Abhijit, which was inserted as No. 20 in the original list. The first mention of Abhijit occurs in the Taittirîya Brâhmaṇa, and it formed already a part of the nakshatra series in the time of the grammarian Pâṇini.[6] The latter's date is probably at the end of the 3rd century B. C. The earliest mention of the 28 nakshatras in China (introduced by the Buddhists) is in the middle of 3rd century B. C.[7]

Accordingly we have roughly, as the termini *a quo* and *ad quem* for the composition of our treatise, the third century B. C. and the second century A. D. This is about the period of the last stage of the Vedic literature, *viz.*, that of the Sûtras. To this period, belong the two small astronomical treatises, the Nakshatra-kalpa and the S'ânti-kalpa, which are attached to the Kauśika Sûtra of the Atharva Veda.[8] I have not been able to examine any copies of them, but a brief account of them has been given by Professor Weber in his *Vedische Nachrichten von den Naxatra* (pp. 390–393). From this account it appears that the statements, especially, in the Nakshatra-kalpa, show a curious resemblance to those in our manuscript. Thus the Nakshatra-kalpa, too, gives lists not only of the shape, the divinity, the number of stars, and the duration of muhûrtas of every one of the 28 nakshatras, but also of their fourfold distribution into Eastern, Southern, Western and Northern, of their gôtra (or race of Ṛishi), and of the kind of food that may be taken under them. The Nakshatra-kalpa adds some further particulars, corresponding statements to which may have been in the lost portion of the manuscript, or may possibly be found in that portion which I have not yet been able to examine.

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[6] See Weber, *Die Vedischen Nachrichten von den Naxatra*, part II, pp. 279, 307, 325.

[7] See *ibidem*, part I, pp. 298, 300.

A confirmation of the age of the work may be found in the circumstance, that the information given in it is ascribed to Pushkarasârin. This renowned teacher is said to have been a contemporary of Buddha. He is mentioned as a teacher in the Prâtiśâkhya Sûtra; and is also cited in the Vârttikas to Pâṇini by Katyâyana, their author.[9]

On the whole, therefore, and subject to the result of an examination of the whole manuscript, for which I have not yet been able to find time, I have come to the conclusion that this part of the Weber Manuscripts contains a hitherto unknown work belonging to the last stage of the Vedic period of Sanscrit literature.

I will, however, here add a few curious particulars that I have noticed in my cursory comparison of the manuscript with Prof. Weber's account of the Nakshatra-kalpa and similar works. The list of gôtras differs entirely; the only coincidence is in the gôtra of Kṛittikâ. Most of the daivatas agree; the most striking difference is in the case of the 27th nakshatra (Aśvinî), for whom our manuscript gives Gandharva as the daivata, while the Nakshatra-kalpa, in common with all other known works, gives the two Aśvins. Other differences may be mere blunders, thus Vaishya in No. 11 and Pushya in No. 26, for Viśvê and Pûshan respectively. Naṛiti in No. 18 may be a local variety of Nirṛiti. Curious are also, in our manuscript, Âbhivṛiddhi and Âryamâkalpa in Nos. 24 and 25, for Ahirbudhnya and Aja-êkapâd respectively. The transposition of Âpa in No. 17, and of Naṛiti in No. 18, may be an accidental mistake for Naṛiti in No. 17 and Âpa in No. 18. In the case of No. 20 (Abhijit) our manuscript gives no daivata at all, the usually given daivata being Brahman; but this, too, may be an accidental omission.

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[8] See Weber's *History of Indian Literature,* p. 153.

[9] See Weber's *History of Indian Literature,* pp. 102, 285.

As to the number of stars, composing the several nakshatras, our manuscript differs in nine cases from the Nakshatra-kalpa; *viz.*, in Nos. 2, 7, 8, 16, 17, 18, 20, 22, 27. Curiously enough in five out of these nine cases (*viz.*, Nos. 2, 7, 8, 16, 20) our manuscript agrees with Brahmagupta's statements.

With regard to the duration of the muhûrtas, our manuscript has two curious differences. Firstly, it enumerates only five nakshatras of a duration of 15 muhûrtas, while the usual number in the Nakshatra-kalpa and other works is six. These works add Bharaṇî (No. 28), to which in our manuscript a duration of 30 muhûrtas is given. Secondly, our manuscript gives to No. 20 (Abhijit) a duration of 8 muhûrtas, against the usual one of *one* muhûrta. The whole list of durations stands thus:

Weber MS.	Nakshatra-kalpa, etc.
6 nakshatras of 45 muhûrtas.	6 naksh. of 45 muh.
16 „ of 30 „	15 „ „ 30 „
5 „ of 15 „	6 „ „ 15 „
1 „ of 8 „	1 „ „ 1 „

I now proceed to Part II of the Weber Manuscripts. See Plate I, fig. 2. It consists of seven leaves, unfortunately mutilated on the left-hand side, which would have shown the numbers of the leaves. Their size is 6 × 2$\frac{3}{16}$ inches. Four leaves have 9 lines each to the page; the three others, only 6 lines. This may possibly show, that the two sets belong to two different manuscripts, but I have not yet been able to examine them more closely. The characters are again a variety of the North Western Gupta.

The page (obverse of the leaf), figured on Plate I, reads as follows. The paper is very soft, and some portions being rather fretted, are very difficult to read.

1, ... ता ध्यदम् तस्य तद्वचनं श्रुत्वा रुद्रो वचनमब्रवीत् OC अहं शिवो
विशालाक्षि त्वं शिवा नामनामतः
2, ... विनाशाय दचनाशाय तिष्ठ तु • OC ये च त्वां पूजयिष्यन्ति कीर्तयिष्यन्ति
ये नराः प्रदास्यसि वरं तेभ्यो य
3, ... वस्तथा • OC बलिधूपप्रदानेन पुष्पदीपानुलेपनैः भक्त्या च प्रयता मर्त्या
तेषां त्वं भवकामदा • OC≡
4, ... प्रवक्ष्यामि यानि ○ गुह्यानि ते शिवे • आहूता येस्त्वमागम्य भविष्यसि
वरप्रदा • OC‡ योजनानां
5 . . खे पि स्थिता श्रुत्वा गमिष्यसि • ओम् जया जयन्ती विजया अमोघा
अपराजिता • जया जांबु

6, ... जंभनी रिपुनाशनी • १५ सहस्रकिरणा भद्रा पुंगवा ब्रह्मचारिणी माया
मायाविनी सद्या कंबुग्री

7, . . . नना • १६ शुक्तिकर्णी महानागा अजेया अपराजिता • शक्तिकर्णाग्निदंष्ट्राख्या
वेताडी वेदनिर्मिता:

8, . . . दीर्घलांगुला ऊरुका जातहारिणी • विदिका विजया धन्या असिलोमा
एकोदरी • १८ धल्लघल्ला सर्पना

9, . . . जिह्वा महागल्ला • तुरुकी च तरुडी च वलूकी च शिवा तथा • १९ आरण्यी
च शृगाली च भैरवा भीमदर्शना:

It may be noticed (see the Plate) that the interpunctuation is indicated by a dot, or occasionally two dots. The numerals are, again, of the ancient style. In the following Roman transliteration I have supplied, in brackets and italic type, the missing portions. Here the metre and context has been a guide, though to some extent, of course, the restorations are conjectural. It will be seen from these that, as a rule, the space of four aksharas or ¾ of an inch is lost, *i. e.*, that the original length of the leaf must have been 6¾ inches. The work is written in the ślôka metre.

1, ... tâ hy=aham [।]
tasya tad=bachanaṁ śrutvâ Rudrô vachanam=abravit ॥ 10
Ahaṁ S'ivô Viśâl-âkshi tvaṁ S'ivâ nâma nâmataḥ [।]
2, [*Kâma-dêva-*]vinâśâya Daksha-nâśâya tishṭha tu ॥ 11
Yê cha tbâṁ pûjayishanti kîrtayishyanti yê narâḥ [।]
pradâsyasi varaṁ têbhyô ya
3, ... vas=tathâ ॥ 12
Bali-dhûpa-pradânêna pushpa-dîp-ânulêpanaiḥ [।]
bhaktyâ cha prayatâ martyâ têshâṁ tvaṁ bhava-kâma-dâ ॥ 13
4, ... pravakshyâmi yâni guhyâni tê S'ivê ।
âhṛitâ yais=tvam=âgamya bhavishyasi vara-pradâ ॥ 14
Yôjanânâṁ
5, [*saha*]srê 'pi sthitâ śrutvâ gamishyasi । ôm [।]
jayâ jayantî vijayâ amôghâ aparâjitâ ।
javâ jâmbû-
6, [*nada-prabhâ*] jaṁbhanî ripu-nâśanî ॥ 15
Sahasra-kiraṇâ bhadrâ puṁgavâ brahma-chârịṇî ।
mâyâ mâyâvinî sadyâ kaṁbu-grî
7, [*vâ rakt*]-ânanâ ॥ 16
S'ukti-karṇî mahâ-nâgâ ajêyâ aparâjitâ ।

śakti-karṇ=âgni-daṁshṭrâlâ[10] vêtâḍî vêda-nirmitâ ॥[11] 17
8, . . .â dîrgha-lâṁgulâ huhukkâ jâta-hâriṇî ।
viddhikâ vijayâ dhanyâ asi-lômâ vṛik-ôdarî ॥ 18
Dhalaṇḍhalâ sarpa-nâ
9, [*thâ dîrgha*]-jihvâ mahâ-galâ ।
turûkî cha tarûḍî cha balûkî cha śivâ tathâ ॥ 19
Âraṇyî cha sṛigâlî cha bhairavâ bhîma-darśanâ ।[11]

This may be translated thus:—

(10) Hearing his (her) words, Rudra spoke as follows: (11) I am S'iva, oh large-eyed-one! Thou shalt be called S'ivâ after my name; and thou shalt be the cause of Kâmadêva's destruction and Daksha's death. (12) Those men that shall worship and extol thee, to them thou shalt grant gifts, as well as to them that . . . . (13) Those mortals that show their faith and devotion to thee by offering of sacrifices and incense, by flowers, lights and anointings, to them thou shalt be the bestower of their worldly desires. (14) I will announce to thee, oh S'ivâ, all the secret things concerning thee! By whomsoever thou art called upon, to him thou shalt come and bestow on him gifts. (15) Even if thou art at a distance of a thousand yôjanas, yet thou shalt hear and go to him. Oṃ! Thou art victorious, conquering, triumphant, unerring, unsurpassable, swift, brilliant as gold, crushing, destroying (thy) enemies, (16) thousand-rayed (like the sun), good, spouse of the Puṅgava (bull-like man), holy, illusory, creating illusions, ever-new, shell-necked, red-mouthed, (17) oyster-shell-eared, a great Nâga, invincible, unsurpassable, strong-eared, fiery-toothed, a Vêtâḍî (goblin), set up by the Vêdas, (18) spouse of him with the long liṅga, a roarer, ravisher of new-born babes, transfixer, conqueror, enricher, with sword-like hair and wolf-like belly, (19) *Dhalaṇḍhalâ* (?), mistress of serpents, long-tongued, large-throated, *turûkî* (swift ?), *tarûḍî* (young ?), *balûkî* (strong ?) as well as lucky, wild, jackal-like, awe-inspiring, of fearful aspect.

I add the Roman transliteration of the reverse page. It is still more worn, and still more difficult to read:—

1, ... bandha-môchanî ॥ 20
Bhagavatyai namas=tubhyaṁ êhy=âraṇyê śivê śubhê ।
adushṭê bhaṭṭinî bhaṭṭê guhî

---

[10] The text actually reads *śakti-daṁshṭr=âgni-karṇ=âgni-daṁshṭrâlâ*, with a stroke of cancellation drawn through the first *daṁshṭrâgni*. For *śakti* probably *śukti* should be read, though the epithet *śukti-karṇî* is already mentioned in the preceding hemistich.

[11] The interpunctuation is here indicated by two dots placed one above the other, like the visarga (:), instead of the single dot used everywhere else.

2, ... sinî ॥ 21
Ek-âkshara-ravê dhâtrê tṛi-lôka-guru-vatsalê ।
satya-vâdiny=umê chaṇḍê viśalyê śatru-nâśani ॥ 22
Bhaya-dê dhana-dê
3, ... katu-vinâśani ।
daityânâṁ bala-hartâri mâṁsa-śôṇita-bhôjani ॥ 23
Vapâ-dhûpa-priyê rôdrî kâla-râtri mahâ-ravê ।
asi-
4, [*lômê*] . . dantî śûlalô (?) śûla-bhîsbaṇî ॥ 24
Paṁch-âyushyê shaḍ-âdhikyê na[12] ch=âshṭadaśa-bhishaṇî ।
kṛishṇê gauri pradîptî
5, [*cha*] . . . laṁba-chûchukê ॥ 25
Mêgha-dundubhi nirghôshê sarva-vyâdhi-pramôchani ।
sarva-vyasana-môktâri kali du-svapna-
6, . . . [॥ 26]
. . dûti śivê gauri karâḍê lôhit-ânanê ।
prachaṇḍê amṛit-ôdgârê[13] abhra-yânê manô-javê ॥ 27
7, ... yê vṛiddhê mâtṛi-varga-prachâriṇi ।
śrî-lakshmir=vapuḥ-pushṭis=tvaṁ siddhiḥ kîrtir=êva cha ॥ 28
Hrî śântiḥ kânti-rasa
8, ... tu sâdhani ।
yadi pâśa-balaṁ satyaṁ viśvê dêva-balaṁ yadi ।[14]
nâśayishyasi śatrûṇâm=âyur=vîryaṁ dhanaṁ .
9, . ।
[*dêva-râjasya satyêna pûrva-diśi*] yadi sthitâ ॥ 30
Dharma-râjasya satyêna dakshiṇasyâṁ yadi sthitâ ।[15]
Varuṇasya

This work appears to be a *stôtra*, or hymn, in honour of S'iva's spouse, Pârvatî, after the manner of the Purâṇas. Perhaps it may be possible, hereafter, to identify it with some work already known. I may mention that, in glancing over another page, I have noticed directions given as to the particular kinds of sacrifice which are to be offered (to Pârvatî ?) in the case of each of the four castes. The passage runs as follows :—

Amâtyê ghṛita-hômaḥ kartavyaḥ ॥ Brâhmaṇê dadhi-ghṛita-hômaḥ nâma-gôtraṁ sarvêshâṁ grâhyam ॥ [*Kshatriyê*] ghṛita-madhu-hômaḥ ॥ Vaiśyê dhânya-hômaḥ ॥ S'ûdrê matsya-hômaḥ ॥ Sarva-vaśîkaraṇê vachâ-hômaḥ.

---

[12] Or *navâ* for *nachâ*.

[13] Or perhaps *ôdbhârê*. The letters are indistinct.

[14] Here the number 29 is omitted in the text.

[15] See note [11] on page 51.

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P20731

That is: In the case of a minister an oblation of clarified butter should be made; in the case of a Brâhman, an oblation of curds and clarified butter, (and) the name and gôtra should be mentioned in every case; in the case of a Kshatriya, an oblation of clarified butter and honey (should be made); in the case of a Vaiśya, an oblation of rice (or grain); in the case of a S'ûdra, an oblation of fish; (and) generally for the purpose of subjecting any one to one's power, an oblation of Vachâ (or the root of *Acorus calamus*).

Part III. See Plate I, fig, 3. There are six leaves; four of them are mere fragments, but two are fairly complete; one of the latter has been figured. These two measure 6¾ by 2½ inches, with 6 lines to the page. The characters are a North Western Gupta variety. The figured page reads as follows :—

1, ... मेन धोवितव्या—स्वस्थो भवति ॥ नमो विद्युजिह्व
2, ... युजु युजु—युजि युजि—मालिनि—विमाननि—अमुकं नृ
3, . . . मयी प्रतिमा कर्त्तव्या—सा प्रतिमा सर्षवतैलेन मक्षयितव्या
4, . . . अ○ ग्नि जुह्य ॥ असुको ज्वरितो भवति— ॥ मोचितुकामेन तद्यथा
5, . . इट्टि इट्टि—इट्टि इट्टि इट्टि—क्षमसि—माक्षसि—कटकपलि[16]—
6, . टकं प्रेषामि—इमं पर्वतराजानं रवतु—कुष्ठहिंगु परिजप्य—

Roman Transliteration.

1, ... mêna dhôvitavyâ ı svasthô bhavati ॥ namô Vidyu-jihva-
2, [*mâtaṁga-râjasya*] yuju yuju ı yuji yuji ı mâlini ı vimânani ı amukaṁ nṛi-
3, [*pa-śulva*]mayî pratimâ karttavyâ ı sâ pratimâ sarshava-tailêna makshayitavyâ
4, . . . agni juhya ॥ asukô jvaritô bhavati ॥ môchitu-kâmêna ı tad=yathâ
5, . . iṭṭi iṭṭi ı iṭṭi iṭṭi iṭṭi ı kshamasi ı mâkshasi ı kaṭaka-pali[16] ı
6, [*ka*]ṭakaṁ prêshâmi ı imaṁ parvata-râjânaṁ ravatu kushṭha-hiṁgu parijapya ı

The reverse page runs as follows :—

1, . . m=pitavyô môkshô bhavati ॥ namô Vidyu-jihva-mâtaṁga-râjasya ı tad=yathâ ı kulimâ-
2, [*li kulimâ*]li ı kulimâli ı kulimâli ı svâhâ ॥ śulbasya pratimâ kartavyâ ı taila-ghṛitê-

---

[16] Or, perhaps, only *kaṭa-pali.* The second *ka* is half deleted.

3, [*n = âmuka-nṛi*]pasya nâmêna sô dahyati — ‖ môchitu-kâmêna ǀ
gandh-ôdakam=parijapya ǀ i-
4, ... môcha ǀ satasati ǀ dhana-dhana svâhâ ‖ sâ pratimâ
snâpayita-
5, [*vyâ*] . . . . . maḥ S'abarâṇâm ǀ prakhalê prakhalê ǀ prakhalê pra-
khalê ǀ viddhê
6, ... gṛihya nisêhitavyaḥ ‖

This appears to belong to some work on sorcery; and from the fact that on the second leaf occurs the phrase *sarva-siddhânâṁ paṁchâbhijñânâṁ namaḥ* it would seem to be a Buddhistic work. For the "five knowledges" are a well-known Buddhist term. The diction is a barbarous mixture of Sanskrit and Pâli. The following is a tentative translation :—

"(The image) should be washed with . . . . He will be well. Salutation to the elephant king with the lightning-like tongue! Yuju! Yuju! yuji! yuji! Oh Mâlinî, oh Vimânanî! Of such and such a king let an image of copper be made! That image should be rubbed with mustard oil, (and) having burned (it in) fire . . . . . , such a one will be attacked with fever. If it is wished to deliver him (*from fever*), the following (*charm should be used*) : "Iṭṭi, iṭṭi, mayest thou forgive, mayest thou wipe off; Oh Kaṭakapali; I send an army; let him praise this mountain-king!" Having uttered a spell over kushṭha and asafœtida, (this remedy) should be drunk; (*then*) there will be deliverance. Salutation to the elephant-king with the lightning-like tongue! (*Then to be said*) as follows: "Hail to her who bears a chaplet of kuli (*Solanum Jacquinii*)"! An image of copper should be made; (this should be rubbed) with oil and clarified butter (*and heated*) in such a king's name; (*then*) he will burn (*with fever*). If it is wished to deliver (*him*), a spell should be said over fragrant water: "iṭṭi, iṭṭi . . . . . deliver him, oh Satasatî, Dhana-dhana, hail!" That image should be bathed (*with the fragrant water*) . . . . . (worst) of the S'abaras! oh wicked one! oh pierced one! . . . . Having taken (*him*), he should be warded off.

Part IV. See Plate III, fig. 1. No more than the fragment which has been figured exists of this manuscript. It is, however, of very considerable interest, as it presents a species of the North-Western Gupta character, which forms the link between that and the Central Asian type of Nâgarî characters. For comparison the forms of the superscribed vowel *e* and of the consonants *j*, *t*, *n* may be especially noticed.

The figured page reads as follows :—

1, ... ग्रय विचक्षणः षष्टाङ्गसंप्रपूर्णेन ज्वर . . . .

2, ... क भवति ह्यभिरूपः सुसंस्थितः जातिस्मरो धर्मदान . . .
3, . . . यताम् ८ द्वात्रिंशल्लक्षणान्येवमशीतिव्यंजनानि च . . . .
4, ... भवत्यङ्गीरसः कथम् ९ लक्षणैः सर्व्वदनेन . . . . .
5, . . . शुद्ध्यते समचित्तेन भवत्यङ्गीरसो मुनिः १० हे . . . . . .
6, ... ः समागमो जिनैर्नित्यं . . . .

In the following transliteration, I have, as before, supplied missing portions, where it was possible, in brackets and italic type. The work is written in the ślôka metre, and it will be seen that about four or six aksharas are lost on each side, on the assumption that the extant piece formed the middle of the leaf. Accordingly the whole leaf, in its original state, probably measured 7 inches, allowing a little for the margins.

1, ... [*ati*]śaya-vichakshaṇaḥ [।]
ashṭ-âṅga-saṁprapûrṇ[*ô*] na [*d*]v[*i*]r[*a*] . .
. . . . [7 ॥]
2, ... k[*ô*] bhavati hy-abhirûpaḥ su-sa[*ṁ*]sthitaḥ [।]
jâti-smarô dharma-dân . . .
3, . . . yatâm 8 [॥]
Dvâ-s-tri[*ṁ*]śal-lakshaṇâny=êvam=aśîti-vyaṁjanâni cha [।]
. . . .
4, ... bhavaty=Aṅgîrasaḥ katham 9 [॥]
Lakshaṇaiḥ sarvva-d[*â*]nêna . . . . .
5, . . . [।]
śuddhyatê sama-chittêna bhavaty=Aṅgîrasô muniḥ 10 [॥]
Hê . . . . . .
6, ... ḥ [।]
samâgamô jinair=nityaṁ . . . . [11 ॥]

Reverse:

1, ... dânasya chêsṭhitaṁ [।]
t[*ê*]n-âsi . . . .
2, . . . [12 ॥]
[*S*]mrit[*i*]m[*âṁ*]=ś=cha kathaṁ vâ syân=matimâṁ=ś=cha vichakshaṇa[*ḥ* ।]
. . . .
3, ... [*a*]rhasi 13 [॥]
Aśaṭaḥ smṛitimâṁ hi syân=matimâṁ=ś=cha vicha[*kshaṇaḥ* ।]
. .
4 . . . êṇ-âpi prajñâyâ dharma-dhâraka 14 [॥]
Akshaṇêbhyaḥ ka . . . .

5, . . . gachchhati [।]
kêna pramattô bhavati bravîhy=êtan=mam=ânaghaḥ 1[5 ॥]
. . .
6, ... [*mâ*]rga-śîlêna gachchhati [।]
śunyatâ-bhâvan-âbhyâsa-tapa . . . . . . [16 ॥]

This may be translated thus :—

(Angirasa is) pre-eminently clever, thoroughly full of the eight-fold (qualities) . . . . . (7) He is handsome, well-put-together, a rememberer of his former existences, an imparter of the Law (to others) . . . . . (8) The 32 attributes as well as the 80 marks . . . . . . , how does Angirasa possess them? (9) By his attributes, his imparting of all things, ... , his equanimity he is purified,—is the Muni Angirasa. (10) . . . . . . his intercourse is constant with the Jinas . . . . (11) . . . . . . his function is the imparting (of the Law) . . . . . (12) How is he thoughtfull and intelligent and clever . . . . . art thou able (to tell me?) (13) He is guileless, thoughtful, intelligent and clever, ... (full of) wisdom, versed in the Law. (14) From inopportune things . . . . . . he goes (away); with reference to what he is indifferent and (yet remains) sinless,—that do thou tell me! (15) . . . . he walks in the moral precepts of the path (of holiness), . . . asceticism (and) the practice of meditation on Sûnyatâ (or Nirvâṇa).

It is difficult to judge from such a small fragment, what the subject of the whole work may have been. That of the fragment itself is an eulogistic description of the Muni Angirasa. From the technical terms, occurring in the fragment, it seems clear that the work is Buddhistic.

Part V. See Plate II, fig. 1. There are eight leaves, measuring $8\frac{1}{2}$ by $2\frac{9}{16}$ inches. They are mutilated, however, on both sides. There are five lines to every page. The characters belong to the round variety of the Central Asian Nâgarî.

The figured page, being the reverse, reads as follows :—

1, ... ष . . द शष्यत पूज . . . .
2, ... ह्यर्दंदण्डेन परिमुचिष्यति—याव एवमेव परिमुच . .
3, . . . शस्त्र ○ क्रमति न विषा नाग्नि नाशीविष न कक्खोर्दं न वैताल न
4, . . . शं करो ○ ति अन्यत्र पुरिमकर्मविपाकेन—एवमुक्तो भगवां म . .
5, . य . सेनापतिमिदमवोचत्—साधु साधु माणिभद्र अनुजानामि मि

In Roman transliteration, as before :—

1, ... sha . . da śashyata pûja . . . .

2, ... ddhy-arha-daṇḍêna parimuchchishyati | yâva evam=eva parimuchch[*ishyati*]
3, [*na*] . . śastra[*ṁ*] kramati na vishâ n=âgni n=âśi-visha na kakkhôrdda[17] na vaitâla na
4, . . [*ba*]laṁ karôti atyattra[18] purima-karma-vipâkêna | evam-uktô Bhagavâṁ ma[*hârâ-*]
5, [*jaṁ*] ya[*ksha*]-sênâpatim=avôchat | sâdhu sâdhu Mâṇibhadra anujânâmi mi

The obverse page has the following :—

1, ... manta varṇavanta yaśaśvina 6 [‖]
Mahâ-bala-mahâ-k[*â*]ya va . . . . [|]
. .
2 . na . manasâ Buddhaṁ vandanti Gautama 7 [‖]
Kumbhakarṇô Nikumbhaś=cha Siddhartthaṁ=aparâjitam [|]
ma .
3, . . . dantô cha Sahasrâkshaś=cha Piṅgala [‖]
Kavilô Dharmadirṇaś=cha Ugratêjô . .
4, . . [|]
. . tvaṁ śaraṇaṁ yânti su-p-prasannêna chêtasâ 9 [‖]
tad=yathâ kadyê-kôdyê[19] . . . .

---

[17] This is the passage referred to in my paper "The Third Instalment of the Bower MSS." in the *Indian Antiquary*, Vol. XXI, p. 369. On another leaf of the same MS., the word occurs once more, but spelled *kâkkhôrdda* with a long *â*. I wish to take this opportunity to correct my reading of the word in the Bower MS. It is there spelt *kaḥkhôrda*, with the jihvâmûliya before *kh*, not *kavkhôrda*, as I first read it. I owe this correction to a suggestion of Dr. A. Stein, who informs me that in modern S'âradâ writing the difference between a superscribed *r* and the jihvâmûliya is very small. He suggests that there may be a clerical error in the Bower MS. This, however, is not probable. The forms of the superscribed *r* and the jihvâmûliya are widely different in the Bower MS., but on the other hand (as, for that matter, in S'âradâ also) there is a resemblance between the super-compounded *v* and the jihvâmûliya. Hence I took the symbol to be that for *v*, while I should have recognized it as the symbol of the jihvâmûliya. Dr. Stein, further, informs me that the word *kakkhôrda* occurs also in VII, 298 of the Râjataranginî, in the form *khurkhuṭa*, and that it is still used in modern Kashmîrî in the form *khurikhâkhus*. He suggests that it is rather these more modern forms that represent the proper spelling of the word, with reference to the correct placement of *r* (*i. e.*, *karkhôda*, not *kakhôrda*). I do not agree with this; we have, in the Bower MSS. and the Weber MSS., the earliest (known) spellings of the word, compared with which the more modern spellings in the Râjataranginî and in Kashmîrî are more likely to be corruptions

[18] Perhaps *atyattra* is an error for *anyattra*, and *vipâkê na* may have to be separated.

[19] The letter which I have read *dy* is doubtful. For a facsimile of it, see Plate IV of the alphabet.

5, ... i . i . . i . i . âha — yattra (śibha-dattâ) bhagava . . . . . .

This may be translated as follows :—

"He will be delivered from . . . . . condign punishment; and so forth (*as before down to*) even so he will be delivered . . . . , no weapon can hurt him, nor poison, nor fire, nor poisonous snake, nor Kakkhôrdda, nor Vaitâla, nor . . . . . can have power over him here (in this world) through the natural consequence of his deeds (done) in former existences." Having thus spoken, the Blessed one spoke to the Mahârâja, the General of the Yakshas (thus) : "Verily, verily, oh Mâṇibhadra ! I permit thee . . . . . .

The brilliant, the glorious (6), they of great strength, of great body . . . . . . intently praise Buddha. Gautama, (7) Kumbhakarṇa, and Nikumbha (praise) the Siddhârtha, the invincible, and . . . danta, Sahasrâksha and Pingala, Kapila, Dharmadirṇa and Ugratêja . . . . , they seek thy protection with a well-pleased mind, (9) (saying) as follows : "Kadyê, kôdyê."

I do not think that much can be lost at the two sides. Lines 4 and 5 of the reverse show this. On two other pages the *mahâyaksha sênâpati Mâṇibhadra* and four *mahârâja yakshasênâpati* are spoken of, which shows how the lacuna should probably be filled up. The original size can also be calculated from the ślôkas on the obverse page. This page seems to give an enumeration of Mahânâgas. Of the ślôkas, those numbered Nos. 6, 7, 8 and 9 are preserved. The rest is in prose. The whole reminds one somewhat of the snake-charm in the Bower MSS., which I have published in the *Indian Antiquary*, vol. XXI, p. 349 ff. The full size of the leaf, in its original state, may have been about 9¼ inches, inclusive of margins. The figured leaf is the best preserved ; some of the others are in a scarcely legible state. But it seems clear from what remains that the work contained a charm given by Buddha (Bhagavân) to the Mahâyaksha Mâṇibhadra.

Part VI. See Plate II, fig. 2. There are five leaves, measuring 7¾ by 2¾ inches, with 7 lines to the page. The leaves, though practically complete on the left side, are greatly mutilated on the right side, by nearly one-third. The characters are another specimen of the round variety of the Central Asian Nâgarî.

The figured page is the reverse and reads as follows :—

1, ... त्मव इत्त इत्त च मन्निशक्तः . . .

2, . व . रचस संगतां काले कल्किंनां कवयो वोदुः 3

3, . .म् . द्ना पुरुष   ग्राह्य रामंतामभिनिर्दिशेत् 8

4, अभिपेक्षा महा ○ त्मनो राजपुत्रं कुलोद्गतः 8⌒ य
5, . : सप्त प्रकृतयो यस्य राष्ट्रं च निरुपद्रवम् 8⌢ न
6, नितः राजानः करदा यस्य विग्रय विजयोद्धतः 8≈ इष्टिय . .
7, अनित्यमानुषां लोकांस्तु संजते⁘ 8⊊ निषण्डनिगमप्रौ . . . .

In Roman transliteration I give the obverse page (not figured) first:—

1, . . 40 [॥]
Vyapêta-rôga-maraṇaṁ vipraṁ sa[*ṁ*]parikî[*r*]tyatê ।
apritiś=ch=âbhishakta . . . [. . . . . . *41* ॥
. . . . .]
2, tatô 'yaṁ kuṇḍâśî puṁśchalî-patiḥ [।]
vapâ-pushpa-nibhaṁ vastraṁ mahârâja . . . [. *42* ॥
. . . .]
3, jâmbukaś=ch=êti tat-samam [।]
lêhakô 'vyakta-vachanô dhûrtas=tu . rtiva . [. *43* ॥
. . . .]
4, vidhushikô mataḥ [।]
chatur-bhâgas=turîyaṁ syâ jaghanyaṁ kaṭi [. . *44* ॥
. . . .]
5, vikramêṇa balêna cha ।
uttamô yaḥ samânêbhyaḥ sa [. . . . . . . *45* ॥
. . . . .]
6, . . . laukikânâṁ tath=aiva cha [।]
parinishṭhâ-vidhi-jñô yaḥ sa [. . . . . . . *46* ॥
. . . .]
7, ... ni . kaḥ [।]
shaḍ-vaṁśô râja-yajñâ yas=tan-tu [. . . . . . *47* ॥
. . . .]

Reverse (figured).

1, ... [।]
. ndhava vṛitta vṛitta cha sanniruktaḥ [. . . . *48* ॥
. . . .]
2, . . va . [।]
rahasa saṁgatâṁ kâlê kartsnitâṁ kavayô vîduḥ 4[*9* ॥
. . . .]
3, . . m [।]
[*pra*]dattâ purusha-jñâñ=cha râmaṁ tâm=abhinirdiśêt 50 [॥
. . . . ।]
4, âbhipêkshâṁ mahâtmanô râja-putraṁ kul-ôdgataḥ 51 [॥]
Ya [. . . . .]

5, . ḥ [।]
sapta prakṛitayô yasya râshṭraṁ cha nirupadravam 52 [॥]
na [. . . . . *prakî*]
6, rtitaḥ [।]
râjânaḥ kara-dâ yasya viśaś=ch=âvijayî-kṛitaḥ 53 [॥]
Ishṭiya [. . . . . ।]
7, anitya-mânushâṁ lôkâṁ=s=tu saṁjatê[20] । 54 [॥]
Nighaṇḍa-nigama-prâṁ [. . . . . ।]
. . . .]

The obverse of the next leaf continues as follows :—

1, . . -ch-chhatraṁ kshatriyair=Buddha-nirjitaiḥ 55 [॥]
Eka-ch-chhatrâṁ mahiṁ vyaṁktê [. . . . . ।
. . . .]
2, vanâd=upavanaṁ smṛitam [*56* ॥]
Padminî rêju râjîva-chatra-paṭṭavatî smṛi[*tâ* ।]

The remainder is almost illegible.

The leaf that immediately precedes the foregoing two leaves, reads as follows :—

Obverse.

1, ... shṭhaś=chaṇḍa-saṁjñitam 24 [॥]
Paramê-shṭhî mataḥ śrêshṭhaḥ prê . priya . da [. . ।
. . . .]
2, [*kî*]rtitam 25 [॥]
Pada-kṛich=charmakara syât=tapitas=tu vamô mataḥ [।]
lâvaṇyam=âhur=madhu [. . . . . *26* ॥
. . . .]
3, . svasâ tu bhaginî matâ ।
vâta-pitta-kaph-âtmanô vyâdhayaḥ [*parikîrtitâḥ 27* ॥ . . .
. . . .]
4, . . ttâ hy=upadravaḥ [।]
ajñô vêśaḥ samâkhyâtô nuttaṁ prêritam=uch[*yatê 28* ॥
. . . .]
5, . . hûtaḥ [।]
talpaṁ tu śayanaṁ jñêyaṁ khaṭv=êti . . thâ vaku 2[*9* ॥
. . . . ।]
6, kilâsaṁ pâṇḍuraṁ jñêyaṁ dôlâ prêṅkh=êti saṁjñitaḥ 30 [॥]
Barhiṁsi cha [. . . . . ।
. . . .]

---

[20] This verse is blundered ; four syllables are wanting. Perhaps read *saṁjayatê*. The final double dot is not a visarga, but the mark of interpunctuation.

7, . bhavanam=uchyatê । 31 [॥]
Pradhânaṁ[21] yu[*dha*]m=ity=âhur=âyôdhanam=iti [*smṛitam* ।
. . . . *32* ॥]

Reverse.

1, . da . ô dâsa-vṛittayaḥ sarandhra iti saṁsmṛitaḥ [।]
ada . . . . [. . . . . . *33* ॥
. . . .]
2, . taṁ vinirdiśêt [।]
bṛindârakas=tu vijñêyô yaḥ siṁha-natavâṁ taraḥ [*34* ॥
. . . . ।
.]
3, hanaḥ prêta-râja syâch=chhushmî tu Maghavaṁ mataḥ 35 [॥]
. . [. . . . . ।
kuṁ]
4, bh[*î*]las=tu matô nakraḥ kurmô gûḍh-aṅga uchyatê । 36 [॥]
. ptsava [. . . . . ।
. .]
5, . . panâma syâ kârakô bhṛitakô mataḥ 37 [॥]
Utthyaṁ praśasta[*ṁ*] vijñê [*yaṁ* . . . . ।
. . . . .]
6, . prôktô mallêraḥ kêkarô mataḥ 38 [॥]
Parô 'patânaṁ martyam[22]=abhidhyâ[*nê*]na [. . . ।
. . . .]
7, [*saṁpracha*]kshatê । 39 [॥]
Yôtraḥ sa khalu vijñêyô yaḥ sutasy=âsutô mata[*ḥ* ।
. . . .]

This work is written in ślôkas, from which it is easy to calculate how many syllables are lost on the right hand side. The number varies from about 12 to 18. Those aksharas which are actually lost are indicated by dots enclosed within straight brackets; those, not thus enclosed, indicate illegible letters. On an average, one-half (or 16 aksharas in each line) is lost of each ślôka. The space required for these lost aksharas would be 3½ inches, allowing for a small margin on the right-hand side. Accordingly the total length of the original leaf must have been 10½ inches.

In the following I give the translation only of those passages which are complete, taking the proper sequence of the leaves :—

(Verse 25.) By *paramêshṭhin* (he who stands foremost) is meant the best. (26) A *pada-kṛit* (foot-maker, shoe-maker) should be (understood to be) a worker in leather. By *tapita* is meant vomiting. (27)

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[21] Read *pradhanam*. So in the Amara Kôsha.

[22] This pâda is short by one syllable. Perhaps read *'patânakaṁ*.

By *svasâ* is meant a sister. All diseases (are said to be) due to air, or bile, or phlegm. (28) A disguise is called *ajña* (incognito). Something dispatched is said to be *nutta.* (29) *Talpa* should be known to be a bed. (30) *Kilâsa* should be known to be a kind of jaundice. A swing is termed *prêṅkhâ.* (32) A war they call *pradhana ;* it is also known as *âyôdhana.* (34) That charm which contains the *siṁha-nata* (?, *nata* is *Tabernæmontana coronaria*) should be known to be the *Vṛindâraka* (*i. e.*, best of its kind).[23] (35) [*Nṛi*]*hana* should be understood to be the king of the Prêtas. By *śushmin* (*i. e.*, powerful) is meant Maghavân. (36) By *kumbhîla* is meant a crocodile. The tortoise is said to be *gûḍhânga,* (*i. e.*, having hidden limbs). (37) By *kâraka* is meant a paid servant. (38) *Utthya* should be known to be that which is excellent. By *mallêra* is meant squinting. (39) Excessive spasmodic contraction is known by the name of *martya* (*i. e.*, mortal). By *yôtra,* indeed, should be known that which is the means of distilling the Soma extract. (41) A death which is not preceded by any illness is praised as *vipra* (*i. e.*, excellent). (42) A *kuṇḍâśin* is a keeper of harlots. A garment [fit to be worn by] a Mahârâja is one which resembles flowers and the omentum. (43) A *lêhaka* (licker, lisper) is one who does not speak plainly. (44) *Turîya* should be (understood to be) a quarter. (49) A mystery (plot ?) harmonizing in time is what the poets know as *kartsnitâ* (*kṛitsnatâ*, or completeness). (52) Whose state possesses its seven constituent elements, and whose country is free of disturbance. . . . . (53) To whom kings pay tribute, and whose people are never conquered. . . . . (56) An *upavana* (grove or small forest) takes its name from a forest (*vana*). (57) A lotus is known as *rêju* or *râjîva* or *chatrapaṭṭavati* (cf. Skr. *śatapatra*).

This clearly shows that the work is some Sanskrit vocabulary or "kôsha." Perhaps it may be possible, hereafter, to identify it with some one of the existing and known kôshas ; or it may turn out to be a new and hitherto unknown kôsha-work. It appears to contain a good number of new words.

On the left-hand margin of the reverse of the last-copied leaf, opposite to the 3rd and 4th lines, there are faint traces left of the number 6. This, therefore, is the sixth leaf of the manuscript. As there are, on the average, 8 ślôkas on a page, or 16 on a leaf, there should be about 90 ślokas (allowing a blank page to commence with) on the six initial leaves of the work. As the 6th leaf, however, only brings us down to the middle of the 40th ślôka, it may be concluded, that the work was divided in chapters (*adhyâyas*), and that the 40 ślôkas, a portion of which has been preserved, belong to the second chapter, while the first chapter must have contained about 50 ślôkas. Perhaps when the remainder of the existing fragment has been read, this point may be more certainly known. I have at present only read and copied those leaves, on which I could discern any numbers. These show us the partial preservation of the following ślôkas: 24–40 and 41–57; and this, consequently, proves that the figured leaf is the seventh of the manuscript.

---

[23] This is puzzling. Perhas *taraḥ* is a clerical error for *naraḥ*, and the meaning may be "one who has subdued a lion is a *Vṛindâraka.*"

The manuscript is rather carelessly written; thus we have *vidhushikô* for *vidushikô* on line 4 of the obverse of the 7th leaf; and *kurmô gûḍhaṅga* for *kûrmô gûḍhâṅga* on line 4 of the reverse of the 6th leaf, and other blunders.

Part VII. See Plate II, fig. 3. This manuscript consists of 7 leaves, measuring about 5 by 2½ inches, but they are mutilated on the left-hand side. There are mostly six lines to the page; a few leaves have 7 lines, but these may possibly turn out to belong to a different manuscript. The characters are again another specimen of the round variety of the Central Asian Nâgarî.

The figured page reads as follows :—

1, तंज्ञ पूजितम् तथागतं नमस्यामि संबुद्धद्विपदोत्तमम् भग
2, . . . म् ॥ उत्तिले—दले—दत्तिले—सिद्धिरस्तु स्वाह—यः क
3, वतः श्रवकः भिक्षुर्वा भिक्षुणी वा उपासको वा उपासिका वा—इ
4, . . इमं च मे हृद□ं पूर्वरात्रमपररात्रं मनसि करिष्यति
5, . . . ण्डेन परिमुच्चिष्यति—दण्डार्हप्रहारेण परिमुच्चिष्य
6, ... ि□ . पेण—प□□ा□र्हो लोम

In Roman transliteration ;—

1, [. . . . .] . jña pûjitam [॥]
Tathâgataṁ namasyâmi saṁbuddha-dvipad-ôttamam [।]
Bhaga
2, [. . . . .] . . . m ॥
Uttilê, dalê, duttilê, siddhir=astu svâha; yaḥ ka [*ś=chid=Bhaga-*]
3, vataḥ śr[*â*]vakaḥ bhikshur=vâ bhikshuṇî vâ upâsakô va upâsikâ vâ, i-
4, . . imaṁ cha mê hṛida[*ya*]ṁ pûrva-râtram=apara-râtraṁ manasi karishyati
5, . . [*da*]ṇ[*ḍ*]êna parimuchchishyati, daṇḍ-ârha-prahârêṇa parimuchchishya-
6; [*ti*] . . . . i . pêṇa ; pa . i . â . -ârhô lôma-

The reverse reads as follows :—

1, ... [*parimu*]chchishyati, imê cha . bhadantê bhaga-
2, ... ham=anubhavêna sa sâgar-ânta-pṛithivîm=anuvicha-
3, ... tpalô narô, kumbha-karṇô mahâ-kumbha-karṇô, âri, kôri,
kâ-
4, lê, pêlôlê, âyê, tâyê, ikshôri, kunê kunikê, yaś=cha mê
5, . . śukla-pakshasya pratipadam=upâdâya kṛishṇa-pakshê vâ snâta-
śu-
6, [*chi*] . . . dharmê saṁghê sa-gauravêṇa, ayô-vihitaṁ chittaṁ
varjitêna âdi . ê

The first passage (obverse, lines 1 and 2) is a ślôka, which affords the means of calculating the extent of the lost portion of the leaf. The dots, inclosed within brackets, indicate the number of lost aksharas. They are ten or eleven, and would occupy the space of about 2¼ inches. The full size of the original leaf, accordingly, must have been 7¼ by 2½ inches. This would seem to show that the smaller of the two extant wooden boards belonged to this manuscript; and this conclusion is confirmed by the fact that the board is inscribed with a line of writing in Central Asian Nâgarî (see *ante* p. 37). The leaf must have been torn exactly in the place where the string-hole originally was situated.

The remainder of the text is in prose. It seems to be another work giving the story of a Buddhist charm. From a remark, which I have noticed on another leaf, it would appear that the charm was communicated by Buddha himself to the Mahâyaksha Sênâpati Mâṇibhadra, with reference to a son of the latter, called Pûrṇaka. The subject of the work, therefore, is similar to that in the Vth Part, and it may possibly turn out to be another copy of the same charm.

The text above quoted may be thus translated :—

I salute the Tathâgata, the best of enlightened men, the Blessed one . . . . . . Uttilê, dalê, duttilê ! May it be effective ! Svâhâ ! If any disciple of the Blessed-one, any male or female mendicant, or any male or female lay-devotee, keeps in mind this my heart in the former part and in the latter part of the night, he will be delivered from punishment, he will be delivered from any stroke of punishment ; etc.

On the reverse occur the names of some Nâgas, *e. g.*, Kumbhakarṇa and Mahâ-kumbhakarṇa.

Part VIII. See Plate III, fig. 2. Of this manuscript only 4 leaves are preserved, measuring 5 × 2½ inches, but mutilated on the right-hand side. They are inscribed with 7 lines to the page, of which the lowest (or the uppermost on the reverse) is almost wholly obliterated. The characters are again a specimen of the round variety of the Central Asian Nâgarî, approaching rather more to the Indian Gupta type.

The figured page reads as follows:

1. . . . . चूर्णेन प्रत्यागच्छंति ॥ कपिलाजिह्वां गृह्य
2. षितव्या हि पूरमिश्रितायाः देवप्रतिमाय धूपो दातव्यो ततो सा अ
3. स मुंचति गुर्गुलुधूपेन प्रकृतिस्थो भवति ॥ उपरु पुटालि चण्ड
4. स्वाह ॥ उपचारः ○ कृष्णे चतुर्द्दश्यां त्रिरात्रोपोषितेन श्वेतप
5. भां दण्डलसूत्रेण व र्ति क्रियते अतसीतैलेन दीपो ज्वालयित
6. . ज्र स्थं . . तं चा सर्व्वरात्रि विद्य परिजपतव्या ततः प्र . . .
7. . . तथ . ना . . . .

In Roman transliteration:

1, ... chûrṇêna pratyâgachchhaṁti ‖ kapilâ-jihvâṁ gṛihya
2, shitavyâ hi pûra-miśṛitâyâḥ dêva-pratimâya dhûpô dâtavyô tatô sâ a
3, sa muṁchati gurgulu-dhûpêna prakṛiti-sthô bhavati ‖ uparu puṭâli chaṇḍa
4, svâha ‖ upachâraḥ kṛishṇê chaturddaśyâṁ tṛi-râtr-ôpôshitêna śvêta-pa
5, bhâṁ daṇḍala-sûtrêṇa varti kṛiyatê atasî-tailêna dîpô jvâlayita
6, . jra sthaṁ . . taṁ cha sarvva-râtri vidy[*â*] parijap[*i*] tavyâ tataḥ pra
7, . . tathâ . nâ . . . .

Reverse.

1, . . śavi . paśyaṁti . . . . . ya . . . . . . ya . . . . paṁ ‖ .
2, kili[*k*]ilikasya jatu-kârêṇa śira-gôlakaṁ kârayêt tatra tôlakêna
3, . . . rmadêna limpitvâ têna gôlakêna śasy-ôttarê ch=chhubhitavyê dhâka
4, . dvitîyaḥ êva bhârô bhavati sarvaṁ vashyati tataḥ pṛikṛich[24]=chhuddhê
5, daṁ cha bhavati ‖ tuṇḍa-kilikilikasy=âkshîni gṛihya pîshayê srôñchatê
6, push[*p*]a-yôgên=âñjitêna gavâchyû-piśâchaṁ paśyaṁti têna cha purusha-vîrya
7, . . trayaṁ piśâchaṁ hanati tapyasya kachchhât=prasêvaka gṛihya gaṁ [. . . . . .]

The text is too mutilated to admit of a satisfactory translation. What there is may be thus rendered:—

He approaches with the powder . . . . . ‖ Taking the tongue of a brown cow . . . . . the image of the dêva is to be fumigated with incense mixed with pûra (*a fragrant stuff*); then that (image) . . . . he gets free (from disease and) through the incense of guggulu (*a fragrant gum resin*) he becomes (restored) to good health. Above the figure . . . . svâhâ ‖ The physicking (should be had recourse to) in the dark half of the month, on the fourteenth day, by a person after he has fasted for three nights and (put on) white (raiment), ... a wick should be made of the cord of a *daṇḍala* (churning-stick ?), (and) a lamp lighted with linseed oil, ... and the spell should be repeated throughout the whole night. Then . . . . they see . . . . . ‖ With red lac he is to form a ball representing the head of Kilikilaka (*i. e.*, Siva) . . .; then having rubbed it with a tôla of . . . . , with that ball in sifted fine grain . . . .; the process is repeated once more; every thing is brought in one's power; then in a thoroughly cleaned, ... , and it becomes . . . . ‖ Taking the eyes of (*tuṇḍa*) Kilikilaka, he should grind (them), he ladles . . . .; with . . . . . anointed with the preparation of flowers . . . . . they can see a piśâcha at a distance of a *gavâchyû* (*gavyûti* ?, or perhaps the name of a piśâcha); and with that power of man . . . . . . he can kill three . . . . piśâchas; (then) taking a bag from the side of the person that does penance . . . .

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[24] The reading is uncertain; it may be *pṛikṛich* or *pṛitṛich* or *pṛinṛich*.

From the above extract it would appear that the work treats of medical charms. It is written in the now well-known species of "mixed" Sanskrit, anciently the prevailing literary language in North Western India and the countries beyond.

Part IX. See Plate III, fig. 3, 4, 5. This manuscript consists of 25 leaves. Some of them show a numbering on the left hand margin in very fine and minute figures. Thus, of the three figured leaves, fig. 3 shows the number 30, fig. 4, the number 33, and fig. 5, the number 36. This circumstance proves that the manuscript is not completely extant, though from the fact that one of the extant leaves is only inscribed on one side, it may be concluded that the manuscript is complete at the end, and that some (10 or 12) of the initial leaves are wanting. Unfortunately the last leaf is too damaged to be read.

The leaves are mutilated at the lower corners, but sufficient is extant to show their full size. It is 5¼ by 2½ inches. Each leaf has six lines. Unfortunately, the writing is extensively obliterated, owing to the circumstance that the thick arsenical coating of the leaves, on which the letters were written, has been greatly damaged, apparently, by damp. In many cases the leaves firmly adhered to one another, and on separating them, the coating, together with the letters which it bore, came off. On the original leaves, portions of the obliterated letters, are still sufficiently visible to permit of their being occasionally identified;

but on the photographed facsimiles, they can hardly be seen. Even the undamaged portions have not come out as clearly on the facsimiles as one would wish. Of course, my transcriptions, given below, are prepared from the originals. As a rule, the top-most and the two lowest lines are, practically, destroyed; and the three middle lines alone are, more or less, fully legible. As I have already observed (*ante*, p. 39), the writing is in the square variety of the Central Asian Nâgarî characters, but, with certain exceptions (see below), in a Non-Sanskritic language. In the transliterations into Roman, I have observed the following method:—

1, Aksharas, entirely lost, are indicated by dots enclosed within straight brackets.
2, Aksharas, extant but entirely illegible, are indicated by dots.
3, Aksharas, extant, but only doubtfully legible, are written in *italics*.
4, Aksharas, lost or partially extant, but conjecturally restored, are *italics* within straight brackets.
5, Aksharas, fully extant and clearly legible, but as to the identity of which I am not fully satisfied, are shown in Roman type within round brackets.

I have printed every akshara separately; but those which make up a Sanskritic word, are joined by hyphens.

The figured leaves read as follows:—

I. (Leaf 30. Fig. 3).

1, . .*i* . la . ji . . — . . pa . — (kh)i . . . . — a . . . .
2, *sa-ba-ra* lô-tṛi — tṛi-pha-(u) — pra-pu-ṇḍa-ri-kha — mâ-ñcha-
[*shṭha*] — [*pi*] ssau . . —
yaṁ r.ê (ṛi) — sprî-kha — (khê) tê nê — ta-ka-ru — pô k*kha* . *ri*
30 kê (kh)î yê
. . . shshê pa lyyê ma lk(kh)ê rsa dha [*ksha llê*] *â śchê* [*sô*] *tô* . la
5, [. .] . . . lê kê .ê .ê sô nô dha lya pô rna [. . . .]
6, [. . . . .]

II. (Leaf 33. Fig. 4).

1, *trau* . . . strau — *ka* . la *hâ* kṛi trau — . . . . *lyka śka* . .*sa*
2, *r*na llê — ku ñchî dha shshê pa lyyê — (khâ) ktrau tta — ma
lk(kh)ê ṛi dha ryâ ka (kh)î trau tta
ll*a* śkêṁ pû (kh)a rsa dha ksha llê — â śchê sô tô dha . .ê .i yê p*y*â
33 *rê* ru ma tsi tha skê dha (ṛi) pô ka rtsê ‖ . rk(kh)i . . . [. .]
5, [. . .] — pi *ss*au . [.] . . ypê ya yaṁ [*kshî yê*] . . . [. . .]
6, [. . . . .]

III. (Leaf 36. Fig. 5).

1, . *da* . . . . . . tṛi — . ha-ri-*d*ṛi — *pi-* . *sa* — pa-la — *pra*-pu-nta-
2, ri-kh — su-kshmê-(u) — vi-ra-ṅkh — ni-lu-tpâ-(u) — hṛi-bê-ra
— kê-lê-ya-kh — pa-ri-
vê-la-kha — va-ra-ṅg tva-chaṁ — mu-stha — śa-ra-ba — sâ-la-
va-rṇî —

36

pṛi-śna-va-rṇî — jî-va-ntî — dê-va-dâ-ru — śa . . *ri* . . . [. .]
5, [. .] .ê . . . [.] . . . . pa . . . kê . . [. . .]
6, [. . . . .]

The reverses of the figured leaves do not yield sufficiently satisfactory readings to quote. But I add transcripts of two other leaves, both obverses and reverses,—of as much as is legible.

IV. (Obverse.)

1, [. .] . . [. . . . .] . . . .
2, [. .] . . . .
3, [.] . pi ssau *lk*(kh)a śô k(*kh*)aṁ rka tha shshí ptsâ . . . . [. . .]
4, . . lyyê—ma lk(kh)ê rsa dha ksha llê a śu sa nâ pa llé—ka . .
5, [*pra-pu-*]nda-ri-kha—ka-ṭu-ka-rô-hi-ṇi—a-*śv*a-kâ-ndha—dê-va-dâ-
ru—pi ssau .
6, ... *a-pa-m*â-rga — *k*ô *skh*ê .o .ṁ rkê . .ô [*shsh*]ê skê ta . . — . .

V. (Reverse.)

1, . *lkkh*ê rsa *t*rî (kh)aṁ . llye pa kî *yé*—pi *lk*(kh)a rsa ra ṅka tsi *sau*
shpa ka ya
2, kâ-kô-ri — kshi-ra-kâ-kô-ri — pi-ta-ri — kshi-ra-pi-*ta-ri* — smu ṛi
ysâ rña yaṁ
3, kshî yê—mi tstsa bh(b)a rka bhbha llê—kṛi ṅka *ññ*a *y*ô ttsa lau
pê kâ
4, [*pé*] yâ mu sai tê sa kâ ts*ó* pra ka ra . *sna* . . . . [. .]
5, . . *ka ra*—yaṁ [. . .] . . . . . . a . [. . . . . .]
6, [. .] . . . [. . . . .]

VI. (Obverse.)

1, *kó lyé* ṅka rya pi ssau *ysâ rña yaṁ ksh*î yê—*sé* ku ñcha ga *shshi*
yaṁ lyyê saṁ shpaṁ
2, rka bhbha llê—yô tsa trî (kh)aṁ bha llê—(tu) mêṁ kâ tsa sa lau
pê yâ *mu* sai *té sa*
3, ka tsô ma lya (kka) tha skê dha (ṛi) mâ ylâ rya ‖ a-śva-ga-
[*ndha*] ṁ—[*a-pa-*]
4, *má*-rga — ta-ka-ru — pra-pu-nta-ri-kha — ma-ñcha-shṭha — ni-lu-
[tpâ-u —]
5, [. .] . ṁ . .ê [. . .] . tth — *kô* stê — *pó* . . . . [. . . .]

VII. (Reverse.)

1, ...
2, ...
3, *ka* .i ka llô na kra mô tsa â śnê ya . . . *llê* . [. . .]
4, . . rêtth sâ tkê ॥ śa-(kk)a-(ṛi) dê-va-dâ-ru — śa-*rsha*-pâ — kushṭha
5, *kha* — trai (kh)ô shshai mai ki sa bh(b)a rka bha llê — pla tkâ rê tha ścha kê tê — sê lai kô
6, ... ॥ lâ . . . . . — ka . . . . — pi .

I cannot attempt to translate these extracts, both because they are too fragmentary, and because they are partially written in a language unintelligible to me. I may notice, however, that they contain series of Sanskrit words alternating with series of Non-Sanscritic passages. The former series consist of Sanskrit names of medicinal plants or drugs, spelled, however, in a most extraordinary fashion. The following is a list of these words with their Sanskrit equivalents :—

Citation.	Name in Weber MS.	Sanskrit.
No. I, line 2	sa-ba-ra-lô-tṛi	śâbara-lôdhra
	tṛi-pha-u	triphala
	pra-pu-ṇḍa-ri-kha (cf. Nos. III, 1, IV, 5, VI, 4)	prapauṇḍarîka
	mâ-ñcha-shṭha (cf. No. VI, 4)	mañjishṭhâ
No. I, line 3	sprî-kha	spṛikkâ
	ta-ka-ru (also No. VI, 4)	tagara
No. III, line 1	ha-ri-dṛi	haridrâ
	pra-pu-nta-ri-kh (cf. Nos. I, 2, IV, 5, VI, 4)	prapauṇḍarîka
No. III, line 2	su-kshmê-u	sûkshmaila
	vi-ra-ṅkh (cf. No. III, 3)	varânga
	ni-lu-tpâ-u (also No. VI, 4)	nilôtpala
	hṛi-bê-ra	hṛivêra
	kê-lê-ya-kh	kâlîyaka
	pa-ri-vê-la-kha	paripêlaka
No. III, line 3	va-ra-ṅga	varânga
	tva-chaṁ	tvacha
	mu-stha	musta
	śa-ra-ba	śârivâ (?)
	sâ-la-va-rṇî	śâliparṇî
No. III, line 4	pṛi-śna-va-rṇî	pṛiśniparṇî
	jî-va-ntî	jîvantî
	dê-va-dâ-ru (also No. IV, 5, VII, 4)	dêvadâru
No. IV, line 5	pra-pu-nda-ri-kha (cf. Nos. I, 2, III, 1, VI, 4)	prapauṇḍarîka
	ka-ṭu-ka-rô-hi-ṇî	kaṭuka-rôhiṇî
	a-śva-kâ-ndha	aśvagandhâ

Citaions.	Name in Weber MS.	Sanskrit.
No. IV, line 6	a-pa-mâ-rga (also No. VI, 3 and below)	apâmârga
No. V, line 2	kâ-kô-rî	kâkôlî
	kshî-ra-kâ kô-rî	kshîra-kâkôlî
	pi-ta-ri (see bi-ḍâ-ri, below)	vidârî
	kshî-ra-pi-ta-ri	kshîra-vidârî
No. VI, line 3	a-śva-ga-ndhaṁ (see No. IV, 5)	aśvagandhâ
No. VI, line 4	pra-pu-nta-ri-kha (cf. Nos. I, 2, III, 1, IV, 5)	prapauṇḍarîka
	ma-ñcha-shṭha (cf. No. I, 2)	mañjishṭhâ
No. VII, line 4	śa-kka-ṛi	śarkarâ (?)
	śa-rsha-pa	sarshapa
	ku-shṭha-kha	kushṭhaka

On some other leaves I have found the following:

	a-mpṛi-ta-pâ-ttṛi	amṛita-patra[25]
	a-va-mâ-rga (see a-pa-mâ-rga above, No. IV, 6)	apâṃârga
	ka-ru-ṇa-sâ-ri	kâlânusâri
	kshî-ra-bi-ḍâ-ri	kshîra-vidârî
	ta-ma-la-pâ-tṛi and ta-ma-la-pâ-dha-ṛi	tamâla-patra
	tri-phâ-u 3	triphala 3
	pi-ppâ-u	pippala
	pu-ta-na-kê-śi	pûtanâkêśi
	pu-na-rna-ba	punarnavâ
	pṛi-ṅka-ra-chaṁ	bhṛiṅgarâja
	pri-ya-ṅku and pṛi-ya-ṅgu	priyaṅgu
	bi-ḍâ-ri (see above, No. V, 2)	viḍâlî or vidârî
	bi-la-pa-tti	vila-patra or vilva-patra ?
	bha-lla-ta-kha	bhallâtaka
	ma-hâ-mê-dha	mahâ-mêda
	mê-dha	mêda
	lô-tṛi and lô-dṛi and lô-tta-ṛi	lôdhra
	śâ-ri-ba	śârivâ
	śi-ri-sha-pu-shpa	śirîshapushpa
	śai-lê-ya-kha	śailêyaka
	sa-rja-ra-sha	sarja-rasa
	styô-ni-ya-kha	sthauṇêyaka

The spelling of such words as *tṛi-phâ-u, ni-lu-tpâ-u, pi-ppâ-u* is very curious. The identity of the former is clearly established by the numeral figure 3 which I have found following the word in one place, and which is intended to explain its meaning "the three myrobalans." The liquid consonant *l* is apparently omitted, and the vowel attached by a side-stroke to the preceding akshara. This side-stroke is also used with final consonants, when they have no inherent vowel; they are, then, attached to the preceding akshara by a side-stroke and written a little below the line,—a practice which is well-known in ancient Sanskrit writing, being used instead of the modern *virâma*. Thus in *pra-pu-nta-rikh* (No. III, 1) and *pra-pu-nta-ri-kha* (Nos. IV, 5 and VI, 4) we have an instance of the same consonant (*kh*) being written with and without the inherent vowel (*a*).

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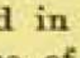
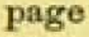
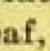
[25] Or perhaps for Skr. *amrâta-patra*, a bye-form of *amla-patra*, a kind of sorrel.

Part IX of the Weber MSS. appears to me to belong, both with regard to characters and language, to the same class of writings as the Kashgar manuscript, published by Mr. Oldenburg. The latter, too, is not only written in what I have called the square variety of the Central Asian Nâgarî, but it also shows occasional Sanskrit words interspersed in the text. Thus we have *brâhmaṇam* in the 5th line of the reverse (syllables 7–9), and again, on the obverse, *mahâkaruṁ* (Skr. *mahâkara*, a name of Buddha) in the 1st line (syllables 14–17), *vâjrêṁṅkusha* (Skr. *vajrâṅkuśa*) in the 4th line (syllables 10–13), and *brâhma* in the 5th line (syllables 8 and 9). More doubtful are the following: reverse, line 3, *bhṛiṅgârêṅku* (*bhṛiṅgârâṅka?*) and *śâstrêṁ* (*śâstra?*), line 4 *nêrvânaṁ* (*nirvâṇaṁ*); obverse, line 1, *êṅku* (*aṅka?*), line 3, *âstrêṁ* (*astra?*), and further on *klêśa*. Quite certain is the occurrence of numerals. In the obverse, 2nd line, 74 (), 4th line 75 ( ); in the reverse, 1st line, 77 ( ), 3rd line, 78 (), 5th line 79 (). This order shows, that the pages are wrongly placed in Mr. Oldenburg's plate. The lower part is really the obverse page of the leaf, and the upper part, the reverse.

The following is my reading of the Kashgar MS., observing the proper sequence of the pages:—

Obverse.

1, pa . tsñê kta shshê ê-ṅku khâ jṛi a kau ta chchê—ma-hâ-ka-ruṁ
shê khai pê pê ñya chchê pê shpiṁ nu—dha ryâ yknê ymê ttsê
śmô ña shshê mi na nâ śô [. — . . . .]
2, shshê yai nu stmau shña tkha lñê shshê pi su mê rttsê mrâ chnê
70+4 pô yśi ñña shshê tkhê ylai ñaṁ ktê nê stya ltsê śai ttsa
lkâ shshê ñchâ nai śai rñê śchya shshê [. . . . . — . . .]
3, syi shshêṁ â-strêṁ ña ○ ktê ttsa kha khâ rpô — klê-śa tma
shshêṁ chêṁ lâṁ tna sû rêṁ tspô naṁ kshê ñchai — dha lskô
shshê chau khê ma vi trêṁ śa . shshê ñchai . [— . . . .]
4, tma sa 70+5 ñaṁ kchyêṁ yê tkhêṁ tsa yai nu vâ-jrêṁ-ṅku-sha
rnê nê — ylai ñaṁ ktñê khê shsa ka pô sta khrô chchê tê lki
nê — krêṁ tpê [. . . . .]

5, ysha sta — khê smai klyau nka sta brâ-hma ññai khê rtsyai pô śai shshê — yâ dha shshê ñchai i lai ña ktêṁ pô ylai ñaṁ ktê ttsâ shtsa pra lya shsha rkhê [.. ..... — .....]

6, pê lai ktê shsha na khrô tstsa na — khaṁ rpô rmêṁ skkha tma paṁ lsko shsha na rtau sna yâ kê — bhai shshê ttsê khaṁ ttrê â rskô rshêṁ yâ .... [— ....]

Reverse.

1, śô kâ nê nê rvâ tshai — khâ ra sta ñiś ykhâ rchla klê nê tña ktô pkhâ ñmtsa ya mña râṁ nê . . la tma . 70+7 â ñmâ lâ shlñê shshau . shpâ [. . . . . . . — . . .]

2, pê shshê kha stsyâ strê nau su pê ñya chchê — tkhaṁ ttsa ññê jaṭ snai ykô rñê shsha yâ kê ktsê ñê la laṁ shka sta rya pô yśê ññê shshau rtsa śê ktsau ña [. — . . . . —]

3, bhṛi-ṅgâ-rê-ṅku[26] śû ○ kê sâ-strêṁ î tê mai tta rshshê 70+8 pû vñêṁ ktê shshê tkhê bra mñaṁ ktê śpâ lmêṁ snai mê nâkh — yai tmu tha ktau tra [. . . . . —]

4, nê rmi tyâ mshê ñchai khnô lmê nô ktya knê sa sta rêṁ — nê-rvânaṁ shshai kê ttsa śai shshê dha rkau chai êṁ shkê tstsêṁ ta ttha shshê . pa khâ kta [. . . . . — . . . .]

5, śpu kha kô ya khâ spa brâ-hma-ṇaṁ 70+9 ê mprê tma shsha na . . tma śtkhâ ra a kshâ sta — klai naṁtth śa ma śkaṁtth ka rsa tsi . . khâ . [. — . . . . .]

6, . ru tê pa . mâ ga ri — gâ ṅpê lai ktê shshai kêṁ tsa chaṁ rkâ sta a sta ryai — pô pê śai shshê ka llô ynâ shtsi pê lai . . ñai—

It will be noticed that a mark of interpunctuation occurs at regular intervals, *i. e.*, after every 13th syllable; thus marking off sections of the text of 13 syllables each. Taking this as a basis of calculation, it will be found that the text between each pair of consecutive numbers is made up of six sections; and that from 9 to 13 syllables in each line are lost at the sides of the leaf. The space required for these would be 3¼ to 4¾ inches. The leaf, in its existing state, measures 14 to 15¼ inches in length. The leaf, in its original state, accordingly, must have measured about 19½ inches, allowing a small margin on either side.

The fact that the text is divided and numbered in regular paragraphs renders it probable that the work is composed in some kind of poetry, each paragraph forming a verse or stanza of six sections of 13 syllables each. I am not aware of any Sanskrit verse of this description. I suspect, that the language is some kind of Mongolian, with Sanskrit technical terms interspersed. The nature of the latter, perhaps, suggests that the work belongs to the Buddhist Tantrik class of literature.

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[26] Or perhaps read *śṛi-ṅgâ-rê-ṅku.*

On the Early Study of Indian Vernaculars in Europe.—By G. A. Grierson, Esq., F. C. S.

Some years ago, while perusing an old number[1] of the *Calcutta Review*, I chanced upon the following sentence. 'Antonio, a Roman Catholic Missionary at Boglipur on the Ganges, translated the Gospels and the Acts into the dialect of the people of that district.' This was given as a quotation from a certain Dr. John, who wrote in 1809, and would refer to a translation of a portion of the New Testament into the local dialect of the people of Bhágalpur some years previously, that is to say at the end of the 18th century. The first translation of the Bible made by Carey was published in 1804 (into Maráthí), and most of the succeeding ones appeared in the second decade of the 19th century, so that so far as I am aware Father Antonio's version was the first translation of the Bible into any language of Northern India, and, curiously enough, it must have been made into Maithilí, a language into which the Bible has never been translated since.[2]

At the time when this statement of Dr. John caught my attention, I was occupying a good deal of my leisure time with the vernaculars of Bihár, and it seemed to me that, if I could get hold of Father Antonio's translation, it promised to afford me information regarding the condition of Eastern Maithilí a century ago. Such evidence would have been an invaluable witness on the subject of the rate of growth of the Vernacular dialects of North India.

I accordingly communicated with Bhágalpur, and learned that Father Antonio had been a Capuchin Missionary there at the end of the last century, and had thence gone to Patná. No trace of the alleged translation could be found. I enquired at Patná and at Ágrá, whither he had subsequently gone as Bishop, with a similar result. From Ágrá he returned to Rome. Being at Rome in the year 1890, I called at the College of the Congregatio de propaganda Fide, and, though a total stranger, when I communicated the object of my search, was most kindly and hospitably received, and given every assistance in searching through the magnificent Oriental Library attached to the Congregation. My efforts were in vain, so far as the immediate object was concerned, for no trace of the missing translation could be discovered, though I saw numerous translations into Nepálí of about the same date. Indeed the Jesuit Fathers, who first entered Nepál in 1661,[3] appear to have made the language of that country their own in a very special manner. The translations which I saw in Rome, were on a far higher grade of excellence, than those into many Indian languages which issued from the Serampore press more than fifty years afterwards. Father Antonio's Bhágalpurí translation, however, could not be found, and there appears little doubt, but that it was destroyed in one of the disturbances in Patna, when the local mission of the Roman church was burnt down by the '*barbari id est badmashi*,' as a quaint Latin chronicle which I was permitted to see at Patna described them. My inquiries at Rome, however, gave me the clues, by the help of which I have traced the information which follows, and which may be found interesting, as showing glimpses of the growth in Europe of the knowledge of Indian languages.

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[1] Vol. V, p. 722, June 1846.

[2] I omit from consideration a few detached extracts translated by the late Mr. John Christian.

[3] The pioneers were Grüber, and Donville. They were succeeded by Ricanete,

In the early part of the eighteenth century, Maturin Veyssière La Croze was in charge of the royal library at Berlin. This remarkable scholar, a profound student in oriental lore, as it was then understood, carried on a copious correspondence with nearly every learned man of his time. This correspondence was published in 1742–46 at Leipzig by Uhl, in three closely printed Latin volumes of about three hundred pages each, under the name of the Thesaurus Epistolicus Lacrozianus, which is still obtainable in old bookshops. I do not know a more entertaining book than this collection of letters on many subjects. The Latin is throughout easy, and the manner in which the various subjects are treated compels the reader's admiration for the learning and ingenuity displayed, while now and then some pit-fall of error[1] into which the wisest has fallen, warns students of the present day to avoid generalizations till we have made fast and firm the data on which we base them.

In the year 1714 we find David Wilkins writing to La Croze from Amsterdam, asking him for assistance in compiling a collection of translations of the Lord's Prayer[2] into as many languages as possible, which Wilkins was publishing in conjunction with John Chamberlayne of London. Amongst other languages mentioned, Wilkins[3] specially states

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a Capuchin, one of whose successors, Father Pinna, wrote a Catechism in Urdú, which, he dedicated to the Rajah of Betiá. Father Pinna died in Patna in 1747.

[1] *E. g.*, when La Croze maintains that all languages are derived from Hebrew and cites the Maráṭhí alphabet in proof thereof (Th. E. La C., III, 65).

[2] Mott had published a similar collection in London fourteen years previously, and Chamberlayne's 'Orationum dominicarum sylloge' was a revised and enlarged edition of this.

[3] Loc. Cit. I, 369, 'alphabeta Singalœum, Jananicum, et Bengalicum' The Bangálí version is quite unintelligible. It is reprinted in the Sprachmeister, v. post.

that he intends to give for the first time specimens in the Singhalese, Javan, and Bangálí languages. This request incited La Croze[1] in November of the same year to write a long communication to Chamberlayne dealing with the subject of the study of languages in general, and vindicating comparative philology from the charge of inutility. He then proceeds to describe briefly the inter-relationship of the various languages as then known to him, and coming to India says, 'I have, however, little to offer concerning the alphabets of this country, except the conjecture that they are derived from that called *Hanscrit.*' The oldest letters of the Brachmans, he adds, can hardly have sprung from any source except from those of the Persians or Assyrians. But, as already remarked, the characters used by the other Indians are most probably derived from those called Hanscrit, which are used by the Brahmans, for on the one hand it is from them that the other Indian tribes imbibed their superstitions, and, on the other hand, Xaca, who laid the bonds of false religions on the peoples of the East, was himself brought up amongst the Brachmans. Moreover the order of the alphabet is the same amongst the Brachmans, the people of Malabar, the Singhalese,[2] Siamese, Javans, and even of the language of Bali, which is the sacred tongue of Laos, Pegu, Cambodia, and Siam.

This change of the initial S of Sanskrit, into H is worth noting from a philological point of view. It seems to point to an authority coming from Eastern Bengal where *s* is in popular speech pronounced as *h*, and no doubt La Croze's immediate source of information was Bernier's travels (1666 A. D.). As Yule and Burnell in the Anglo-Indian Dictionary point out, the term Sanskrit did not come into familiar use till the last quarter of the 18th century. I am in doubt as to what religious reformer is referred to under the name of Xaca. Was it S'ákya Muni ?

So much for Chamberlayne's *Sylloge*, which was published early in 1715. It did not give great satisfaction to La Croze, for he complains[3] in one of his letters that Wilkins, *more suo*, had so 'edited' a Tartar specimen which he had given him, that the donor could hardly recognize it.

In the following year 1716, Ziegenbalg[4] a Danish Protestant Missionary writes from London. It is evidently a letter in answer to inquiries made by La Croze. The word Brachmann, says Ziegenbalg, is wrong, and is not understood in India. The correct word is Braman. So also the language of the Bramans is never called Hanscrit, the only name used by Bramans themselves being *Kirendum*. Here the writer shows that his knowledge is confined to Southern India, *Kirendum* being an attempt to depict the Tamil pronunciation of the word *Grantham*.[1] He adds that the Bramans claim that this tongue is the root of all Indian languages such as the *Malabaric*, the *Wartic*, (*i. e.*, Telugu), and the *Ziglesic*, which are spoken on the Malabar and Coromandel coasts, but he cannot believe that others such as the Malaic, the Mogulic, &c., have any connexion in it. As for Chamberlayne's *Sylloge* it is full of errors in the versions into the languages of Malabar, and when he returns to India he will send La Croze some more correct specimens, correctly translated by the boys of his Malabar school.

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[1] L. C. III, pp. 78 and ff. What letter writers there were in those days! This Epistle covers 17 pages of small type.

[2] Ceilanenses.

[3] L. C. III, 20.

[4] L. C. I, 381.

In September 1716 commenced La Croze's voluminous correspondence with Theophilus Siegfried Bayer, then residing at Leipzig, and subsequently at St. Petersburg, whose name will occur several times in these pages. The early letters afford few points of interest to Indian students. They deal principally with Tangut, Mongolian and Chinese. Incidentally La Croze[2] complains of the vast extent of his correspondence. People write to him from nearly every part of Europe, to the great damage of his time and of his purse.

In March 1717 Bayer[3] ventures to doubt La Croze's theory that the Sanskrit alphabet was derived from Persian, and the latter but faintly defends his opinion, though strongly maintaining that the modern languages of India are derived from that of the Brachmans.[4]

Here there is an interval of some ten years, during which Bayer moved his residence to St. Petersburg, and the year 1717 may be taken as closing the first stage of attempts at a scientific inquiry into Indian languages. Men like La Croze and Bayer had to depend upon the untrained observations of travellers like Bernier, or to chance communications from Missionaries on leave in Europe. In their correspondence, the only vernacular of Northern India which they mention is Bangálí, and I can find no earlier mention of that language in any other work, though Yule[5] quotes the word as meaning a native of Bengal, from Barros, who wrote in 1552. They make no reference to Hindí or Hindústání, though the word "Hindústán" had been used as meaning the vulgar language of India for more than a century.[6] Probably the fact that it was a purely vulgar language, and was considered a mere jargon, led to its being neglected.

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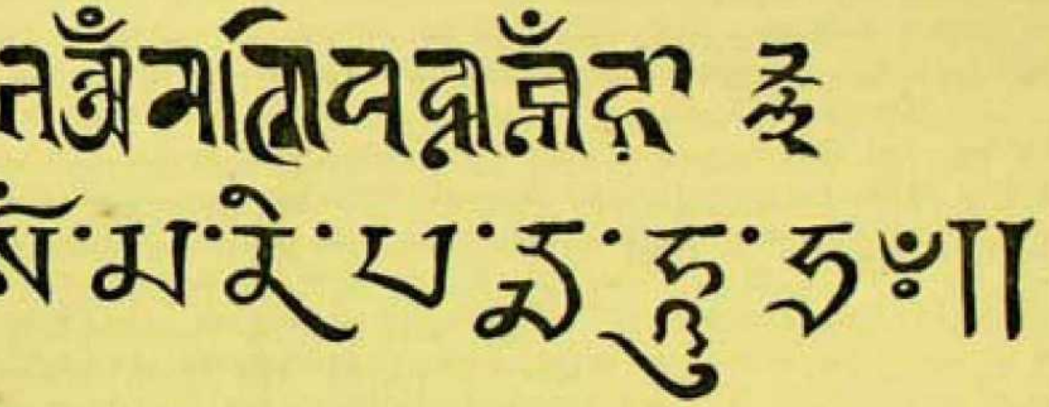
[1] Cf. *Valentijn* (1727) *(Oud en Niew Oost Indien)*, '*Girandam* by others called *Kerendum*, and also *Sanskrita*, is the language of the Brahmins and the learned.' Quoted in Hobson-Jobson, s. v. Grunthum.

[2] L. C. III, 59. [3] L. C. I, 16. [4] L. C. III, 22, 23. [5] *Hobson-Jobson* s. v.

[6] *Hobson-Jobson* s. v.

The foundation of the Imperial Academy of Sciences of St. Petersburg, on the lines of the great French Academy, were laid by Peter the Great, and it was formally opened by the Empress Catherine. The most learned men of Europe (amongst whom was Bayer) were invited to join it, and finally it was placed in a permanent position by Peter II. The first part of the transactions, relating to the year 1726 was published in 1728.[1] These two volumes are very rare, nearly all having been destroyed in a fire which consumed the Imperial Academy and Printing Offices in 1741.

In the year 1727 Daniel Messerschmid, who had been deputed by Peter the Great to explore Siberia, returned to St. Petersburg, and amongst other curiosities brought with him an inscription, and a Chinese printed book. These were made over to Bayer, and he describes them in the third and fourth volume of the transactions.[2] The inscription consisted of two short lines, one being in Brahmanical and the other in Tangut letters. It is reproduced here.



It will be recognized that the first line (which Bayer calls Brahmanical) is in the pointed variety of the Devanágarí alphabet used by the Buddhists of Thibet, and called Lántsha. The second line is the ordinary Thibetan character. Bayer with the aid of his knowledge of Manchu, and of the book to be subsequently described, deciphered this as '*Ong ma ni pa dme ch*[3]*um chi.*' but was unable to translate it. Messerschmid, he says, told him that it was one of the commonest prayers of the Tanguts (*i. e.* Thibetans), and meant 'God have mercy on us.' This decipherment of the well-known Buddhist formula, *Oṁ, maṇi padme,*

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[1] Commentarii ı Academiæ ı Scientiarum ı Imperialis ı Petropolitanæ ı Tomus I, Ad Annum clɔ. lɔcc xxxi. ı Petropoli ı Typis Academiæ clɔ lɔcc xviii.

[2] For the years 1728 and 1729, and published in 1732 and 1735 respectively.

[3] Pronounced like a Greek χ.

huṁ,[1] though its translation was incorrect, marks the first step in a new stage of the study of Indian languages in Europe. For the next few years, European scholars attacked the languages of Northern India through Chinese and Thibetan.

The other curiosity, the book which consisted of eight leaves, had been printed in China, and may be considered as the Rosetta stone of these explorers. It gave in parallel lines an entire syllabary of the Lántsha Devanágarí alphabet, with a transliteration into Thibetan, and into what Bayer calls Mongolian. A reference to Ballhorn's Grammatography will show that these last letters are not in the Mongolian character as now accepted, but more nearly resemble those given as Manchu. They are evidently some Tartar alphabet. A facsimile of the first page and a half[2] is given on plate V. Bayer's first procedure was to establish as far as possible the Thibetan characters. This was an easy task, for the language was already partly known to him, and he had other Thibetan students and books at his command. Then with the aid of this and of other specimens, he established the Manchu transliteration, and finally from these two, he was enabled to make a very fair attempt at transliterating the Devanágarí. In the plate, I have given the transliteration fixed by him. From this he deciphered the *Oṁ maṇi padme hūṁ* of the inscription. It will be observed that the transliteration is incorrect in many particulars.

Having thus made out the Lántsha alphabet, Bayer sent a copy of it to Schultz, a missionary in Madras, and was gratified to learn that the letters could be read by Bráhmans of Northern India.[3] Schultz, himself, to judge from the specimens he gives, cannot at that time have known Sanskrit, or, indeed, any Aryan Indian language. He spells the name of Banáras काश्रा or भनारेसे, and talks of बायराः नाघरोः He, however, describes three alphabets and gives specimens of them, the Devanágarí, the 'Balabandu,' and the 'Akár Nágarí.' They have evidently been sent to Bayer just as they were written down for Schultz who could not read them. By 'Balabandu,' is meant Maráṭhí, but the three alphabets are really all Devanágarí, as written by different hands. Schultz also gave instructions for pronunciation. Some of them may be quoted.

i breue, lingua ad dexteram inclinata.

í longum, lingua ad sinistram mota.

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[1] See J. A. S. B. for 1892, Part I, pp. 30—33.

[2] There were two lines to a page, but as three lines comprise the entire alphabet of simple letters, I have given a page and a half on the plate, in this following Bayer.

[3] 'Brahmanes extraneos et perigrinos.'

u breue, recto ex ore protruditur.
ú longum, quasi duplex, sono in altum prolato.
dha (*ḍ*) *d* formatur lingua quasi apoplectica, vt salina ad palatum opem ferat, *h* admodum auditur: ceterum quasi aliquod *n* præmittitur, quod in primis sentitur, quoties vocalis præcedit, e. g., *ba-ndha*, legitur plane *ban-dha*.

Truly our forefathers must have felt the same difficulties with the cerebral letters, that we have now-a-days, and the 'apoplectic tongue,' is still found in the mouth of many a griffin.

Bayer relates how a certin Calmuc Ambassador named Bordon, who was then in St. Petersburg, helped him to acquire this pronunciation, and concludes with a brief notice, received from India, of the Maráṭhí, Gujarátí, and Maura languages. By the last named, he apparently means Urdú, what the English subsequently called Gentoo, or Moors. All this time he was conducting an active correspondence with La Croze, in which, not only does the Chinese book finds due mention, but we meet one of the earliest efforts of comparative philology, the first four numerals in eight languages.[1] During the next ten years the two friends now and then refer to Indian languages, and to the last La Croze adheres to this old error that the Maráṭhí alphabet is derived from Hebrew.

In 1745, was printed the first grammar of Hindústání, which I have seen noticed. It was written by the missionary Schultz already mentioned. I have not had the good fortune to see the work itself, and my only information concerning it is the title in the Catalogue of M. Garcin de Tassy's Books, 1879, quoted by Col. Yule in his Anglo-Indian Dictionary.[2]

In 1748 was published at Leipzig the *Orientalisch-und-occidentalischer Sprachmeister*, compiled by Johann Friedrich Fritz, and dedicated by him to Schultz. This very curious work contains accounts of over a hundred alphabets from all parts of the world, followed by some two hundred translations of the Lord's Prayer. A good deal of the description of the alphabets of India was contributed by Schultz, whose account of Hindustání is especially interesting and full. This is a general description of the composition of the Urdú language. Attention is drawn to the large number of Arabic and Persian words in its vocabulary, but the student is warned against supposing that it is in any way derived from those speeches. The ordinary Persian alphabet is given, but there is no mention of the Indian cerebralized four dotted letters of that character. Among the Indian alphabets described may be mentioned, Bangálí, Tamil, Grantham, Telugu, Burmese (called Pegu), Maráṭhí, Devanágarí (three varieties, borrowed from Bayer), and Singhalese. There is also a comparative table of fifty common words, in twelve different Indian languages, including Sanskrit, Canarese, Konkaní, and Gujrátí.

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[1] Thesaurus I, 58. The eight languages are, 'Camacinienses, Arincenses, Camteschatquenses f. Yedsenses et Coracenses, Tangutenses et Tibetenses (1 = *Dscyk*, 2 = *Ny*, 3 = *Ssuum*), Persæ, Mogulenses Indi (1 = Hicku, 2 = Guu, 3 = Tray, 4 = Tzahr), Oeselentes, Letti.' Who are meant by the 'Indian Mughals?'

[2] S. V. Hindustanee.

The versions of the Lord's Prayer are collected from widely different sources. Some are very fair and legible. Others are grossly incorrect. The Bangáli translation, which is taken from Wilkins' sample given in Chamberlayne's *Sylloge*[1] is almost worth reprinting as a curiosity for the number of seemingly impossible mistakes it contains. In fact it is quite illegible and unintelligible to every native of Bengal to whom I have shown it. It has evidently been made by some person who got a copy of the alphabet and a general description of the language and then 'greatly dared.' Even his knowledge of the alphabet is incomplete. For instance, he knew that the form for a non-initial *e* is ে, but did not know that it must come before the consonant to which it is affixed. Hence for *de*, instead of writing দে, he wrote দ ে. Other similarly gross blunders occur in the writing,[2] and as for the language, when deciphered, it is not intelligible. Only here and there can a Bangálí word (usually wrongly spelled) be recognized. The incorrectness of this version is very curious, for under the head of alphabets, the Bangálí character is given with very considerable accuracy. Most of the other translations are fair enough. Amongst them I may mention, Hindústání by Schultz, (Persian character; Commences, *ásmán po* (misprint for *par*) *rahtá, so hamaṁrá báp*), 'Brachmanic' (the Latin version transliterated into Devanágarí), Sanskrit (Devanágarí. Commences *úrddhva-loka-sthito mat-pitaḥ*), 'Akar Nagarika ex Caschia' (language, Bhojpurí; character, Devanágarí), Gujrátí, Goanese, Tamil (five versions), Telugu, Sanskrit (Telugu characters), Maráṭhí, Canarese, Sanskrit (Grantham characters), Maráṭhí (current hand), Singhalese, and Burmese (Pegu). Altogether the Sprachmeister is a fairly correct and interesting compilation.

It held the field as an authority on Oriental languages till 1771 when there appeared, from the press of the College de Propaganda Fide, a Latin pamphlet entitled '*Alphabetum | Brammhanicum | seu | Indostanum | Universitatis Kasi |*'. As its name implies it is a description of the Devanágarí alphabet, and is the first book printed in

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[1] No wonder La Croze lamented over Wilkins' editing.

[2] For instance the initial form of vowels is sometimes used instead of the non-initial form, and one consonant is used for another. Thus *bappá*, father, is spelled *bámmaa* বাম্মঅ.

Europe from types in that character.[1] It has an interesting preface summing up the knowledge on Indian subjects gained up to that time. Mention is made of a MS. *Lexicon Linguæ Indostanicæ*, 'Quod Auctorem habet Franciscum M. Turonensem,' a monk of the Surat Mission, which was written in 1704 A.D.[2] There is also a careful and accurate description of the various appliances adopted in India for writing, and the manner of their use. One hundred and nine pages are devoted to a full account of the Devanágarí alphabet, as written 'at the University of Kásí.' This is followed by an account of the Kaithí, or (as it is called in the book) the Nágarí alphabet. For this character also types were cast, more than a hundred years before they were again cast, under the supervision of the present writer, at the Bengal Secretariat Press. We have then a chapter on numerals, and the little volume concludes with two versions of the Lord's Prayer,—one a transliteration of the Latin into Devanágarí, and the other a translation into very fair Hindí, followed by an *Ave Maria*, and Apostle's creed in the latter language.

In the following year (1772) appeared in London, Hadley's '*Grammatical Remarks* | *on the* | *Practical and Vulgar Dialect* | *of the* | *Indostan Language* | *commonly called Moors* |. An account of this work will be found in the Anglo-Indian Dictionary,[3] It is a very incomplete work, and far behind the one to be next noticed. As Col. Yule gives full particulars of this, the first English Hindústání Grammar, a passing notice will suffice here.

Six years subsequently, in 1778, appeared the first attempt at a scientific treatment of Hindústání. It was in Portuguese, and the title page runs as follows:—*Gramatica* | *Indostana* | *a mais vulgar* | *que e practica no Imperio do gram Mogol* | *offerecida* | *aos muitos reverendos* | *Padres Missionarios* | *do ditto Imperio* | *em Roma MDCCLXXVIII* | *na Estamperia da Sagrada Congregaçaõ de Propaganda Fide.* | Like the Alphabetum Brammhanicum, this work was published in Rome. It is altogether an excellent work: and the author or authors had evidently a good grip of the language. The transliteration is scientific, though on a system widely differing from that of Sir W. Jones. As an example '*tum ko bahut piár kartá húṅ*' is given as '*tõm kõ bòhot pêar cartahũ.*' For the first time attention is drawn to the use of the particle *ne* with the past tenses of transitive verbs, and the difficult question of compound verbs is treated with considerable success. It may be noted that the various postpositions *ká, ke, kí, ko,* &c., are treated as declensional forms of the indefinite article, which are placed after a substantive, instead of before as in Portuguese.

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[1] The *Sprachmeister* is a collection of copper plate engravings.

[2] I searched for this in the College Library at Rome, but could not find it.

[3] S. V. Moors.

This concludes my notice of the 'Early Study of Indian Vernaculars in Europe.' A good deal had been done, but the results had hardly penetrated to India. In 1783, the judicious Colebrooke wrote from Calcutta to his family 'you recommend my being assiduous in acquiring the languages. It is what I intend, but there is no danger of my applying too intensely. The one, and that the most necessary, Moors,' *i. e.*, Hindústání, 'by being not written, bars all close application; the other, Persian, is too dry to entice, and is so seldom of any use that I seek its acquisition very leisurely.'[1] The following year (1784) saw the founding of the Asiatic Society, and it is one of our most legitimate sources of pride that it took up the clue where it had been dropped by the Roman Catholic Missionaries, and under the influence of men like Sir W. Jones, Wilkins, and especially Gilchrist, the Indian Vernaculars ceased to be despised for 'not being written' and became the object of investigations which have continued to the present day.

The sacred lamp so lit has never been extinguished, and the greatest living authorities on the subject, Mr. Beames and Dr. Hœrnle, are still, I am glad to say, Members of the Society.

ADDENDUM.

La Croze.

I am indebted to Mr. Quaritch for the following extract from the *Nouvelle Biographie Générale*, which gives a full account of this eminent orientalist.

Veyssiere de la Croze (Mathurin).—orientaliste français né à Nantes le 4 Décembre 1661, mort à Berlin le 21 Mai 1739. Dégoûté de l'étude par la sévérité mal entendue de son maitre, il s'embarqua à quatorze ans, pour la Guadeloupe, où son père négociant éclairé, avait des relations d' affaires. Pendant le séjour qú'il fit dans cette île, il acquit la connaissance des langues anglaise, espagnole et portugaise. A son retour il entra comme novice dans le couvent des bénédictins à Samur (1677), et y prit l'habit (1682). Bien que la vie studieuse de cette ongrégation fut de son goût, il eut des démêlés avec le supérieur et fut menacé de la prison. Effrayé du sort qu'il croyait l'attendre, il réussit à

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[1] Life, p. 13.

s'évader et gagna Bâle (1696) où il embrassa le protestantisme. En même temps il prit le nom de la Croze, que était celui d'un petit bien de sa famille. Ayant passé à Berlin, il devint bibliothécaire de l'électeur (fevr. 1697) aux modiques appointements de 200 écus par an. Il se chargea aussi de l'éducation du margrave de Schweldt. Leibniz avec qui il était lié, le fit nommer professeur à l'université de Helmstädt; mais il fallait pour remplir ces fonctions faire acte de lutheranisme; La Croze se refusa à ce changement de confession. Bientôt après, on lui confia l'éducation de la princesse royale, depuis margrave de Baireuth. Son auguste élève fit augmenter son traitement de bibliothécaire et lui procura la chaire de philosophie au College français (1724). Dans son vieillesse il fut assailli par des affections fort graves, la gravelle et l'hypocondrie, résultat de son application excessive à l'étude. Il mourut à soixante-dix-sept ans, d'un mal à la jambe. Doué d'une mémoire prodigieuse et d'un esprit pénétrant, La Croze fut un érudit fort distingué. Il ne lui manqua pour devenir un homme éminent qu'un jugement d'une plus haute portée. Ses qualités morales, non moins que ses connaissances étendues, lui firent de nombreux amis, parmi lesquels il faut citer Spanheim, Bayle, Beausobre, Lenfant, Leibniz, Cuper et A. Fabricius. On a de lui: Actes et titres de la maison de Bouillon; Cologne (Berlin) 1698 in-12: Observations critiques sur les pièces employées par Baluze dans son histoire de la maison d'Auvergne—Dissertations historiques sur divers sujets; Rotterdam 1707, in 8°: il y en a trois qui traitent: du socinianisme et du mahométisme dont les principes fondamentaux sont les mêmes, d'après lui: du système de P. Hardouin sur l'origine supposée des écrits des anciens: et de l'état de la religion chrétienne dans les Indes.—*Vindiciæ veterum scriptorum contra Harduinum*; ibid 1708 in 8°, réfutation d'une hypothèse qui lui parassait pleine de dangers, et sur laquelle il revint encore dans deux lettres, l'un impr. dans la *Rélation du Voyage litter.* de Jordan, l'autre dans la Biblioth. german. t. XXXIII. La Croze s'était imaginé que le paradoxe du P. Hardouin était le résultat d'un complot formé par la société toute entière des Jésuites; sans doute pour détruire le prestige de la littérature ancienne; *Entretiens sur divers sujets d'histoire, de littérature, de religion et de critique*; Cologne (Amst. 1711—in 12) ou quatre entretiens avec un Juif. On y trouve une dissertation sur l'athéisme trad. en anglais, et une critique aussi injuste que passionée, de l'*Histoire des Juifs de Basnage*;—*Histoire du christianisme dans les Indes*—La Haye 1774 pet. in 8°, et 1758, 2 vol. in 12° trad. en allemand; c'est son meilleur ouvrage. *Histoire du christianisme d'Ethiopie et d'Arménie*; ibid 1739 pet. in 8°; cet écrit est bien inferieur au précédant;—*Thesaurus epistolicus Lacrozianus*—Leipzig 1743-46 3 vol. in 4°; recueil publié par le professeur

Uhle;—*Lexicon æyyptiaco—latinum*—Oxford 1775 in 4°; le manuscrit de cet ouvrage considérable a été revu par Scholtz, et annoté par Woide qui le fait paraître au frais de l'Université d'Oxford. Chaque mot copte est suivi de son équivalent en grec et en latin, mais sans autre explication (voy. *Oriental und exeges.* ***Biblioth.*** *de Michaelis*, t. I, p. 202, et suivi, et *Recherches sur l'Egypte* par Quatremère);—un grand nombre d'articles dans les publications périodiques. Parmi les ouvrages inédits de ce savant, il faut citer un Dictionnaire arménien qui lui avait coûté de longues recherches; un *Dictionnaire slavon.* et un *Dictionnaire syriaque.*

M. N. en *Nouv. Biographie générale*, 1866.

Note on the History of the East India Company Coinage from 1753-1835.—*By* EDGAR THURSTON.

When I was engaged in collecting material for my 'History of the Coinage of the Territories of the East India Company in the Indian Peninsula, and Catalogue of the coins in the Madras Museum,'* the records of the Madras Mint were placed at my disposal by the Madras Government, and I expressed a hope that some one would eventually explore the archives of the Calcutta and Bombay Mints with a view to clearing up many obscure points in the history of the coinage of the Company, which constitutes a complicated branch of modern numismatics.

My head-quarters having, by the fortune of service, been temporarily transferred from Madras to Calcutta, the opportunity has been taken advantage of to examine the records of the Calcutta Mint; and facilities for carrying out the research in my spare moments were courteously given to me by Colonel Baird, F. R. S., Master of the Mint, to whom I have to express my great indebtedness.

The Calcutta Mint Committee Proceedings which are preserved in the Calcutta Mint, commence with the year 1792 (more than thirty years after the establishment of the Calcutta Mint), and are, with very few exceptions, continuous to 1835, where my investigations ceased, as the history of the Company's coinage after that year, in which a general British currency was established, is no longer veiled in doubt and obscurity.

Of the Calcutta Mint Records from the establishment of the Mint in 1760 to 1792, I have been unable to find any trace, and this is the more to be regretted, since the history of the coinage during this period is beset with difficulties, the problem being, as pointed out by Dr. Stanley Lane-Poole* to determine where the native coinage ends and the Company's begins.

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* Madras Government Press, 1890.

Calcutta.

1753. In a despatch to the Court of Directors dated 12th February, 1753, it is mentioned that "the utmost secrecy was necessary with reference to the establishment of a mint at Calcutta, as any attempt to effect an arrangement with the Nawáb would be immediately overset by Juggut Sing." A vakíl was entrusted and consulted, who said that his master, Hackem Beg, had a son in great power at Delhí, who might be able to get a phirmaund from the king; but that this would be attended at least with the expense of 100,000 rupees, and that, on the arrival of the phirmaund at Cossimbazar, it would cost another 100,000 rupees to the mutsuddys and diwáns of the Nawáb to put the phirmaund in force.

1759–60. The establishment of a mint at Calcutta finally took place in 1759 or 1760, and the following is a translation of the parwána: "To the noblest of merchants, the English Company, be the royal favour. In Calcutta a mint is established. You shall coin gold and silver of equal value and fineness with the ashrafees and rupees of Murshidábád in the name of Calcutta. In the suburbs of Bangala, Bihár, and Orissa, they shall be current, and no person shall demand or insist upon a discount upon them. Dated the 11th of the moon Zíhada in the 4th year."

Bengal.

1792. In 1792 a Committee was constituted in Calcutta by order of the Governor-General, Earl Cornwallis, for superintending the mints and enquiring into the general state of the coinage in Bengal, Bihár, and Orissa. Among the instructions given to the Committee were :—

1. To enquire particularly into the cause of the little progress which had been made towards the establishment of the general currency of the sikka rupees.

2. To ascertain the causes of the batta or discount that had frequently been levied on the exchange of a gold mohar for silver.

3. To report whether it would be advisable to declare the gold mohars, and the multiples thereof, legal tender of payment in the three provinces in all transactions, public and private, at the value at which they were then received and paid at the general treasury and in all private transactions.

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* Catalogue of coins of the Moghul Emperors, 1892.

4. To enquire into the state of the copper coinage.

5. To state their sentiments on the practicability and expediency of coining the gold mohars, rupees and pice, or either of those coins, with machinery of similar construction to that in use in the mints in Europe.

Patna, Murshidábád.

On May 14th, 1792, the Mint Master informed the Committee that he had received orders from the Governor-General to establish mints at Patna and Murshidábád, to facilitate the conversion of the various species of silver coins current in the several districts into sikka rupees.

A new gold mohar and sikka rupee of the current coinage were laid before the Committee, who were of opinion that the size, shape, and impression of the mohar were perfect, and equal, if not superior, to the newest English guinea, or any of the gold coins in Europe, the die being precisely the same size as the coin, which consequently bore the whole legend, the letters being cut flat, and the coin being difficult to drill without defacing it, owing to its being milled and of proper thickness. With respect to the rupee, the Committee considered that it was very defective both with regard to its size, thickness, and impression, which was struck with a die of twice the circumference of the coin, so that only a part of the impression appeared on the coin. The letters were considered to be too prominent, and liable to injury from common wear and filing, and the thickness of the coin and absence of milling rendered it liable to be easily filed, bored, and defaced. The Committee, therefore, recommended that the rupee should be coined in every respect in the same manner as the gold mohar.

Benares.

In the Calcutta Mint Committee's Proceedings, 1792, the following historical sketch of the Benares mint (concerning which great confusion exists) by Mr. Barlow, who had been deputed in 1787 to enquire into the trade and coinage of Benares, is placed on record.

A mint was first established at Benares in the 15th year of the reign of Muhammad Sháh (1734). The assay of the rupee was fixed at 22 chauwals, but, by the connivance of the Superintendents of the mint, it was debased to 32 chauwals at different periods before the 30th and last year of the reign.

During the first three years of the reign of Ahmad Sháh (1748–50) the mint was under the charge of Rájá Balwant Singh, who increased the duties on the coinage by attaching the fees of the officers of the mint, and establishing new ones to the same amount. In the 1st year the assay was kept up to 22 chauwals, but in the 2nd and 3rd years the Rájá farmed the mint to one Nandrám who, to increase his receipts, debased the coin to 24 and 32 chauwals. The mint records were burnt by Balwant Singh, and no records were kept in the mint until the 17th year of the reign of Sháh 'Alam (1776). The farmers carried away their books in order to conceal the profits they reaped from debasing the coins. The system of farming out the mints, first adopted by Ratan Chand, Diwán to Farrukhsiyar, at length introduced the custom of changing the value of the rupee every year. Those who had payments to make were consequently obliged to carry their old rupees to the mint to have them re-coined into sikkas, the name given to the rupees of the current year. Previous to the 10th year of the reign of Sháh 'Alam (1769), the new coined sikka rupee, after circulating twelve months, fell 3 per cent., and at the expiration of two years 2 per cent. more, at which value it continued under the denomination 'sanwát.' On the 6th August, 1771, this usage was abolished by the British Government, who resolved that the sikkas coined in the 10th year of the reign should be considered as sanwáts, and that those coined in the 11th and all subsequent years should pass in payment at the same value as the sikkas of the current year.

From the beginning of the 4th to the end of the 6th and last year (1754) of Ahmad Sháh the mint was under the charge of Ághá Asad Beg, Kiladár or Governor of the Fort of Chunár. The assay of the rupees was from 26 to 32 chauwals.

At the commencement of the reign of 'Álamgír II (1754) the mint fell to the Vizier Shujá'ud-daulah. During the 1st and 2nd years the assay of the rupees was from 26 to 28 chauwals. In the 3rd year Shujá'ud-daulah made over the mint to his brother-in-law, Mirza 'Alí Khán, who farmed it to Subháw Chand. The assay of the rupees was from 24 to 32 chauwals. In the 4th year the mint was farmed to the agent of an eminent Benares banker, and the rupees were debased to 64 chauwals and, for the first time, half a ratí in weight. Rájá Balwant Singh refused to receive them into his treasury. In the 5th year the rupees were raised to their proper weight of 9 máshás, 7 ratís (or 632 chauwals), but continued at the debased standard of 40 and 48 chauwals. In the 6th and last year of the reign the rupees were debased to 100 chauwals assay (*i. e.* $\frac{535}{630}$ silver and $\frac{95}{630}$ alloy) and half a ratí in weight.

In the 1st year of the reign of Sháh 'Álam, Shujá'ud-daulah appointed a person on his own part to superintend the coinage, and the rupee was restored to its former weight, (9m. 7r.) and to 26 chauwals assay. During the 2nd to 8th years the assay remained at 40 chauwals. In the latter year (1767) Shujá'ud-daulah, at the recommendation of Lord Clive, resolved to reform the coin. The Benáres mint was, accordingly, committed to the care of Mirzá Hasan, who engaged to restore the rupees to their proper weight and standard. A Delhi rupee of the 18th year of Muhammad Sháh was sent as a sample for the new coinage. This rupee was 22 chauwals fine, but, being worn, had lost 2 chauwals in weight. The new rupees were, in consequence, 2 chauwals deficient, and from that time the Benares rupees continued at 9m. 6r. 6 ch., being 2 chauwals less than the original weight of 9m. 7r. In the 9th year the mint was farmed to Monsieur Gentille, the French Agent at Shujá'ud-daulah's court, and the same assay (22 chauwals) was continued until the 15th year (1774). A considerable portion of the rupees issued in the 16th year contained only 5½ oz. of silver, to 10½ oz. of copper.

In the 17th year of the reign of Sháh 'Álam (1776) the mint was transferred by the Company to Chait Singh, who engaged to coin rupees of 9m. 9r. 6 ch., weight and 18 chauwals fine, and to continue the die of the 17th san, in order to put an end to the confusion in the currency occasioned by the constant alteration of the value of the coin. "All rupees, therefore," the Records state, "coined in the Benares mint since the 17th year of the present reign, ought to be of the same weight and standard, and to pass current as sikkas* of the present year. The rupees current in the district of Benares may, therefore, be classed as sanwát and sikka, the former coined under the Mughal Princes, and the latter since the 17th year of the reign of Sháh 'Álam, when the mint was ceded to the Company by the Vizier, and by them transferred to Chait Singh."

The following table gives information as to the assays, weights, and names of the rupees coined at the Benares mint from its establishment to 1782:—

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* Previous to the time of Farrukhsiyar all rupees coined under the reigning king were considered as sikkas, and passed at their original value during his life. At the accession of a new king, the rupees of the former reign were subject to a batta, and were not received into the royal treasury.

REIGN.		ASSAY.	BENARES WEIGHT.			CALCUTTA WEIGHT.			REMARKS.
			M.	R.	Ch.	M.	R.	Ch.	
MUHAMMAD SHÁH.									
15th to 22nd years	...	22 32	9	7	...	10	...	...	
23th „ 28th „	...	...	...	...	...	...	...	...	
29th „ 30th „	...	22	...	...	...	...	...	...	
AHMAD SHÁH.									
1st year ...	...	...	...	...	...	...	...	...	
2nd to 4th years	...	24 32	... ...	... ...	... ...	... ...	... ...	... ...	
5th year ...	...	32	...	...	...	...	...	...	
6th to 7th years	...	26	...	...	...	...	...	...	
'ÁLAMGÍR II.									
1st and 2nd years	...	26 28	..	...	...	...	...	...	The rupees of the 4th to 6th years of 'Álamgír II were called Trisúlís from having the trisúl or Hindu trident stamped upon them.
3rd year ...	...	24 32	...	...	...	...	...	...	
4th „ ...	...	64	9	6	...	9	7	4	
5th „ ...	...	40 48	9	7	...	9	10	...	
6th „ ...	...	64 100	9	6	4	9	7	4	
SHÁH 'ÁLAM.									
1st year ...	...	26	9	7	...	10	...	..	The rupees of the 1st to 7th years were called Ṭhumkâ Goharsháhís; ṭhumká signifying small, and Gohar Sháh being the name of Sháh 'Álam previous to his accession to the throne.
2nd to 7th years	...	40	...	...	...	...	...	...	
8th „ 10th „...	...	22	9	6	6	9	7	6	Called Chaurá or broad Goharsháhís* to distinguish them from the Ṭhumká or small ones, which Shujá'ud-daulah, at the desire of Lord Clive, ordered to be discontinued.
11th year ...	...	26	...	...	...	...	...	...	
12th „ ...	...	28	...	...		...	...	...	
13th to 14th years	...	28	...	...	...	...	...	...	Called Jhardár from a mark or branch ← marked on the coin.
15th „ 16th „	...	28	...	...	...	...	...	...	
17th „ 28th „	...	18	...	...	...	...	...	...	Sikka rupees of the same weight and fineness, and which ought to pass current at the same value. They are distinguished also by the appellation of machhlídár, from the head of a fish being stamped upon them.

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* Regulation V, 1821, refers to "Ghursháhee or Tirsoolee rupees."

The fact is incidentally mentioned that, when the Sháhzádá (Sháh 'A'lam) invaded Bihár, the mint accompanied him, and a large quantity of Benares rupees were melted down and coined into 'rikabees' (*rikáb*, a stirrup) which were 1r. 2ch. deficient in weight, and of 64 chauwals assay, but were made to pass in the camp as sikkas of the established weight and fineness. It is also noted that two lacs of rupees were annually melted down for the manufacture of the laces and rich stuffs for which Benares was celebrated.

From Mr. Barlow's sketch the following account of the coinage of copper has been derived.

The pice current in the city and district of Benares previous to the establishment of the mint, were mostly coined at Gorakhpur in Oudh from copper brought from the northern hills. The first coinage of pice at Benares was in the 23rd year of the reign of Muhammad Sháh (1742), when 100 maunds weight were struck with the die of the sikka rupee. From that period till the 4th year of the reign of Sháh 'A'lam (1762), no pice were coined in the Benares mint. In the 5th year the farmer of the mint purchased some English copper, and coined it into pice of 10 máshás stamped with the die of Gorakhpur. The number exchanged for a rupee was 45 to 48. The coinage of pice was again discontinued until the 17th year (1776), when it was re-established by permission of Rájá Chait Singh. The new pice were 10m. 3r. in weight, and passed current at about 50 or 51 to the rupee. In the following year a quantity of copper was brought to Benares from Calcutta, and the coining of pice and exclusive privilege of buying and selling copper in Benares granted to one Káshmírú Mall for Rs. 5,000. The weight of the coins continued to be 10m. 3r. and they passed in the bazár at about 52 or 53 per rupee. In the 19th and 20th years the coinage was declared free, and those who brought copper received pice in return, after paying duties. In the 21st year (1779) a considerable revolution took place in the copper coinage. The Nawáb Vizier issued orders to the officers of the Alláhábád mint to reduce the weight of the pice to 9m. 2r. The merchants, finding that their maund of copper yielded 3,650 pice at Alláhábad and only 3,250 at Benares, carried all their copper to the former place. The coinage of pice was, consequently, at a stand still, only 29 maunds being coined during the year. Large quantities of the new Alláhábad pice were brought by merchants to Benares. Rájá Chait Singh at first refused to authorise their currency, but at length gave his consent, and the Alláhábád pice of 9m. 3r. were declared current, and ordered to be received in payment in common with the old pice of 10m. 3r. The result was that the bankers contrived to lower the value of the pice altogether, and were assisted in so doing by large importations from Alláhábád. In the 22nd year Rájá Chait Singh ordered pice to be coined of the same size and weight as the Alláhábád pice, and this contributed greatly to overstocking the circulation. In the 23rd and 24th years, after the expulsion of Chait Singh, the same weight (9m. 2r.) was continued, and the price of pice continued to fall until the famine in the next year, when they sold at thirteen for a rupee. In the 27th year the Resident at Benares ordered that no pice should be issued from the mint under 10m. 3r. and that Gorakhpur pice, weighing 10m. to 10m. 3r. and Benares pice, weighing 10m. 3r. should pass at the same value. The price immediately rose to 58 per rupee. In the 28th year (1787), when it was supposed that sufficient new pice had been coined for the city of Benares, the Gorakhpur pice were forbidden, and only the new Benares pice stamped with a trisúl (trident), and weighing from 10m. to 10m. 3r. and the Gorakhpur pice, re-stamped and not under 10m. in weight, were declared current.

As regards the gold coinage at the Benares mint, it is stated that the gold was assayed there by touch on a species of the salgrám[*] stone so celebrated in the śástras of the Hindus. Upon comparing the Calcutta with the Benares gold mohars, it was found (1787) that the former was about Rs. 2-1-6 better than the latter, *i. e.*, R. 1-14-9 in weight and As 2-9 in assay. It was suggested, therefore, that the Benares mohar should be raised to the same weight and standard as the Calcutta mohar.

Dacca, Patna, Murshidábád.

1792. On June 26, 1792, the following regulations were submitted, among others, for the consideration of the Governor General:—

I. That the rupees coined throughout Bengal, Bihár,[†] and the district of Benares, be of the same weight, standard, size and impression (the rupee of the 19th san then coined at Calcutta).

II. That the mints of Dacca, Patna and Murshidábád be re-established.

III. That one species of copper coin be declared current throughout the Company's dominions.

In August, 1792, it was notified that directions had already been given by the Governor General for the re-establishment of the mints at Dacca, Patna, and Murshidábád; and in the same month, the following propositions were, among others, made by the Calcutta mint Committee, with a view to drawing the old and light coins into the mints, and establishing the general currency of the sikka rupee:—

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[*] Sálagráma stones are fossil ammonites, which, as worshipped by the Hindus, are commonly perforated by holes believed to have been made by Vishnu.

[†] I have, for convenience, adopted a uniform spelling of the names, of places, *e. g.*, Bihár and Murshidábád instead of Behar and Moorshedabad.

I. That after April 10th, 1794, only the san 19 sikka rupees be received at the public treasuries, or issued therefrom;

II. That public notice be given that Government, with a view to enabling individuals to get their old coin or bullion converted into sikka rupees without delay, have established mints at Dacca, Patna and Murshidábád in addition to the mint at Calcutta;

III. That the rupees coined at Dacca, Patna and Murshidábád, be made precisely of the same shape, weight and standard as the 19 san sikka rupees coined at Calcutta, in order that the rupees struck at the several mints might not be recognisable from each other, and might be received and paid indiscriminately;

IV. That the dies be made of the same size as the coin, and that the coins be milled;

V. That the hijrah year be omitted, as the insertion of it, by showing the year in which the rupees were struck, would defeat the object of Government in continuing the 19th san upon the coins.

Dacca.

The earliest weekly account of the new Dacca mint which I have been able to find, is dated 11th August, 1792, on which day the Assay Master also submitted to the Calcutta Mint Committee the accounts of the preceding three months, and promised in future to forward a weekly account.

Murshidábád.

On 23rd October, 1792, the Assay Master of the Murshidábád mint reported that he was erecting workshops, etc., at the Dutch Factory, and hoped to begin coining by the end of the following week. The opening of the mint was announced to the Governor General in a letter dated December, 1792.

Patna.

1793. On 24th February, 1793, the Assay Master of the Patna mint announced to the Calcutta Mint Committee that everything would be ready by the end of the month for the coining of five lacs monthly.

Bengal.

In 1793 a regulation* was passed, by which the gold and silver coin in Bengal, Bihár, and Orissa was reformed, and the currency of any gold or silver coin in these provinces, but the 19th san gold mohar and 19th san sikka rupee, and their respective divisions into halves and quarters, was prohibited.

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* See Prinsep, Indian Antiquities, and Thurston, History of the Coinage of the East India Company.

1795. In a minute dated 2nd October, 1795, the defective state of the copper coinage in Bengal was dealt with, and the principles upon which the copper currency was regulated under Native administration, and the rules that had been prescribed regarding it by the British Government were noted. "Under the Mogul administration," the minute states, "the silver coin was the only measure of value and legal tender of payments. Gold mohurs and pice were struck at the mints for the convenience of individuals, who carried gold or copper to be converted into those coins. But the Government never fixed the number of pice which should be equivalent to a rupee, any more than the number of rupees which should pass in exchange for a gold mohur. From the year 1772, when the mints at Dacca, Patna, and Murshidábád were withdrawn, no pice were coined in the Provinces until 1783, when a contract was concluded with Mr. Prinsep for coining pice on account of the Government. These pice were of four descriptions, *viz.*, whole or pucka, weighing 20 annas, half pice, quarters and eighths. These pice were issued by the Government at the rate of 32 pucka pice, 64 half, 128 quarter pice, and 256 eighth pice for the sikka rupee."

Bengal.

At a council, over which Sir John Shore, Governor General, presided, held on 2nd October, 1795, it was considered expedient that there should only be two descriptions of copper coin, a whole and half pice, to pass at the value of a quarter and an eighth of an anna respectively. It was, accordingly, resolved that a Regulation should be framed, and published for the establishment of a new copper coinage* for Bengal Bihár, and Orissa. Among the provisions of this Regulation were:—

I. That people in all parts of the country be apprised of the value at which the coin was issued by Government, and to be received and paid by the public and individuals;

II. That the value be inscribed on one surface in Persian, Bangálí and Nágarí—the characters used in business in the Provinces;

III. That the coin be declared legal tender of payment for fractions of half a rupee;

IV. That the coin be struck at the Calcutta mint, and not at the three City mints.

The Governor General approved of samples of the new pice and half pice in November, 1795, and orders were issued to coin an equal value of the two coins, until it was ascertained which was likely to be in the greatest demand. A week later, however, the Governor General, understanding that the relative values of the whole and half pice would be best understood by the Natives, especially the lower orders, by substituting "ek pái sikká" and "ádhá pái sikká" for "paun áná and ......(the inscriptions originally ordered) resolved that instructions for altering the inscriptions be issued to the Mint Master.

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* The existing piece was known as the Calcutta, or Prinsep's pice.

Dacca, Patna, Murshidábád.

Towards the end of 1795 trouble was caused by the debased quality of the gold mohars issued from the Dacca, Patna, and Murshidábád mints, and by the rupees issued from the Patna and Murshidábád mints being below sikka standard. It was, after enquiry into the matter, resolved that the coinage of gold at the Patna mint should be for the time discontinued, and that, for the present, no more coins should be struck at the Murshidábád mint. In the course of the correspondence relating to the debased coinage, reference is made to the distinguishing marks of the three mints, but, for precaution's sake, the nature of these private marks (recognisable with a lens) is not mentioned.

Bengal.

1796. In February, 1796, it was resolved that all the gold bullion sent to the Calcutta mint should, until further orders, be coined into quarter mohars, inasmuch as these coins were in much greater request among the lower orders than the gold coins of higher value.

In April 1796, in consequence of a report from the Mint Master, that considerable loss would be sustained annually if Government adhered to their original intention of coining the whole pice at 16 annas and the half pice at 8 annas sikka weight, Government was reduced to the alternative of relinquishing the establishment of the new copper coinage altogether, or reducing its value. It was accordingly resolved that the coining of whole pice of 12 annas and half pice of 6 annas sikka weight, be commenced immediately. The Mint Master, however, reported that dies could not be made for pice of smaller diameter than those then in use, as there would not be a sufficient body of metal to yield a bold impression. It was thereupon ordered that, in the event of its appearing impracticable to insert the whole of the inscription, the Persian portion should be omitted instead of the Nágarí as suggested by the Mint.

Dacca, Patna, Murshidábád.

1797. The coinage of money at the Dacca and Patna mints ceased on 31st January 1797, and December 31st 1796, respectively. The date of the closing of the Murshidábád mint I have not been able to find, but the records of 1799 make reference to "assaying materials which may be deposited in the late mint at that station, and to the best means of disposing of the building which was formerly used for a mint at Murshidábád."

Benares.

1800. In a letter dated 12th December, 1800, on the subject of the irregularities at the Benares mint, the Collector of that city suggested the advisability of a European being placed in charge of the mint, and of having rupees coined there of the same standard as the Bihár sikka rupees.

Benares.

1801. In April 1801, a Committee was appointed to enquire into the state of the Benares mint, and report on the expediency of continuing it. From the Committee's report it appears that, since the abolition of the Residency, the mint had been left without the superintendence of a European official, and that the same species of gold, silver, and copper coins continued to be struck as at the time when Mr. Barlow reported on the mint (p. 54). In recommending a continuation of the mint, the Committee stated that "a connexion has always subsisted between the mint and the manufacturers of gold and silver wire and thread, and the weavers of rich cloths and embroideries made at Benares, on which the prosperity of the trade in these articles appears so much to depend that, in the event of the abolition of the mint, the manufacturers might require some similar establishment to supply its place." In reviewing the report of the Committee, the Governor-General did not think it advisable either to abolish the mint, or to alter the mode in which the coinage had been hitherto conducted, but ordered that the Agent of the Governor-General, the Magistrate of the city, and the Collector of the Province of Benares be constituted a permanent Committee for the superintendence and control of the mint.

Bombay, Madras.

1802. In 1802 letters were received from Madras and Bombay, from which it appeared very necessary that a general reform of their coinage should be carried out, and greater uniformity introduced, so as to relieve the public and individuals from the inconvenience arising from so great a variety of coins, and from so frequent fluctuations in their values. The following plan of a new coinage was submitted by the Calcutta Mint:—

I. That the gold and silver coins of Madras, Bombay, and the Ceded Districts, be of the same standard and weight;

II. That the gold mohar (gold rupee) weigh 180 grains troy, and contain 168 grains of gold and 12 grains of alloy:

III. That the silver rupee weigh 186 grains troy, and contain 173 grains of silver and 13 grains of alloy;

IV. That fourteen rupees be equal to, and pass for the gold mohur.

V. That the mohar and rupee of Bombay be divided into halves, quarters, and eighths (which last could be milled and stamped without trouble);

VI. That the Madras quarter mohar pass for 42 silver fánams, and the Madras rupee for 12 fánams.

In this proposed coinage the quarter gold mohar was of the same intrinsic value as the Madras star pagoda, but the rupee was nearly 4 per cent. better than the Madras Arkáṭ rupee. The proposed new rupee was more than 5 per cent. better than the Bombay rupee, which had been adopted from the Surat Mint.

Baraili, Allábábád.

In a letter dated July, 1803, stating that the Governor-General had it in contemplation to establish a coinage of the same weight and standard throughout the provinces ceded to the Company by the Nawáb Vizier, it was announced that a Committee had been appointed for the superintendence of the mints stablished at Barailí and Alláhábád, which were to report to Government their suggestions for the improvement of the coinage in the ceded provinces. I have not been able to ascertain how long the coinage of the Alláhábád mint continued, but reference is made in December, 1805, to "base coin issued from the mint at Alláhábád a short time previously to the coinage at that place."

Gorakhpur.

1803. In May, 1803, the Collector of Gorakhpur stated that "it is the opinion of some sensible shroffs that, in the course of the ensuing year, it may be advisable to establish a mint at the town of Gorakhpur. In this case it is my opinion that the Lucknow sikka rupee of the 28th san should be gradually introduced as the standard currency of Gorakhpur. On the other hand, the shroffs would greatly prefer the Gorakhpur rupee because of the advantages always derived from the fluctuation of batta on rupees of different standards."

Farrukhábád.

By Regulation XLV, 1803, it was enacted that:—

(Sect. II.) A silver coin, to be denominated the Lucknow sikka rupee of the 45th san, struck in the mint of Farrukhábád, corresponding in weight and standard with the sikka rupee at present struck at Lucknow, in the dominions of the Nawáb Vizier, and thence denominated the Lucknow rupee, is hereby declared to be the established and legal silver coin in the provinces ceded by the Nawáb Vizier to the English East India Company.

(Sect. IV.) A mint shall be established at, or in the immediate vicinity of Farrukhábád, in which Lucknow rupees of the 45th san, and of the prescribed weight and standard, and half and quarter rupees of the same standard and proportionate weight, will be coined.

(Sect. V.) The Lucknow 45th san sikka rupee, as established by this regulation, shall be of the same size and form as the 19th san sikka rupee struck in the mint at Calcutta, and shall bear the following impression:—

Obverse.	*Reverse.*
الله حامي دين محمد	ميمنت مانوس
سايه فضل شاه عالم بادشاه	سنه ۴٥ جلوس
سكه زد بر هفت كشور *	ضرب فرخ آباد

(Sect. VI.) The half and quarter rupee shall be proportionately less than the rupee, and bear the same impression as the rupee.

(Sect. XII.) The Mint Master at Calcutta shall cause a private mark to be put on all dies which may be prepared for the mint at Farrukhábád, but in such a manner as not to be distinguished by the naked eye, or by persons unacquainted with it.

Cuttack.

1804. In 1804 the Commissioner of Cuttack pointed out that great inconvenience was experienced in the Province of Cuttack from the want of a current coin of small value, especially for the use of the troops, and pilgrims resorting to the temple of Jagannáth, and proposed that the coin should bear on one face the figure of Jagannáth, and on the other the value of the coin in Persian and Uriya, and the date. This coin was never struck.

Benares.

In this year the Assay Master of the Benares mint expressed a wish that "a coining, milling, and laminating machine may be sent up to Benares to enable me to ascertain by experiments what advantage there might be in introducing the mode at present used in Calcutta, or in continuing the native method of coining with the hammer only, though the whole figure of the die is not impressed on the rupees that are made in any of the native mints. The Riwá rupees, though of inferior value, have to an inexperienced person very much the aspect of Benares rupees, and are sometimes passed as such."

Baraili.
Alláhábád.

The Mint Committees in the Ceded Provinces (Barailí and Alláhábád) were called on, in 1804, to report their views as to the introduction of a new copper coinage. The Alláhábád Committee recommended that a new copper coinage should be issued, bearing the same impression as the Lucknow rupees struck at Alláhábád. "There are," the Committee stated, "two kinds of copper coinage in currency.

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* The above is quoted from the text of the Regulation. Mr. Rodgers (J. A. S. B., Vol. LVII, Part I for 1888) gives a slightly different version. Ed.

The average exchange of the first is two to an anna, and of the second four to an anna. We recommend that, for the present, the new coinage be limited to the first sort."

Baraili.

In their report the Barailí Committee gave the following details concerning the history of the copper coinage at that mint. "At Barailí no copper coinage was known until about sixteen years ago, when it was introduced by Mahdí 'Alí Khán, the ámil, who coined pice called shamsher sháhí from their having the figure of a sword stamped upon them. They were generally coined out of old pice or copper utensils. This coinage continued two years, after which the same ámil substituted another species of pice called machhlidárs from their having the figure of a fish stamped upon them. A few years after an improved coinage was introduced by the then ámil of Rohilkhaṇḍ, whose pice were termed kaṭár from their being stamped with a dagger. After that, when Mahdí 'Alí Khán became ámil for the second time in 1205 (1790), though the name and appearance remained the same, the weight was reduced from 18 10 17 and even 16 máshás. In this diminished state the coinage of the kaṭár sháhís continued until the cession of the provinces to the Company in November, 1801. They are still current in the southern and eastern parts of Rohilkhaṇḍ, but never obtained circulation equal to that of the najíb khánís, which are current at Rámpur."

The opinion expressed by the Committee was that there were no special circumstances of a local nature which urgently demanded the introduction of a copper coinage, but that it appeared advisable, on general principles, to introduce a sort of pice which would be intrinsically valuable from its purity, and difficult of imitation, and which should bear the same proportion to the local silver currency which the pice in the Lower Provinces bore to the Calcutta sikka rupees.

It appears from a report by Mr. Seton that the system of farming the Barailí mint was abolished in 1802. No alteration was introduced into the standard of the rupee, except that, to mark the period at which the change of system took place, the Persian letter ح (the first letter of the late Súbah Ḥussain 'Alí Khán) was discontinued, and و (W) substituted in compliment to the Lieutenant-Governor.

Farrukhábád.

1805. In February 1805, the authorities of the Farrukhábád mint recommended the coinage of milled in place of hammered money as a measure tending to correct several existing abuses and imperfections. In July a letter from Government stated that "The Governor General in Council has determined on the immediate introduction of a new silver coin into the provinces ceded by the Nawáb Vizier to the English East India Company, and into the conquered Provinces of the Nawáb and on the right bank of the river Jumna, including the Zillah of Bundelkhaṇḍ, to be denominated the Lucknow sikka rupee of the 45th san, struck at Farrukhábád, corresponding in weight and standard with the sikka rupee at present struck at Lucknow in the dominions of the Nawáb Vizier; and has it in contemplation to establish a new copper coin in the provinces above-mentioned, of an uniform weight, to consist of pure copper."

Benares.

1806. In 1806 the Mint Master at Benares, in a report on the copper currency of the Benares Province, stated that "there is no regulation for the weight, size, or impression of pice that can be the least check on any person making them privately without fear of detection. A great part of the pice now in circulation have been made in Oudh, the Ríwá Rájá's country, and other places, and smuggled into circulation." He, accordingly, suggested for the consideration of Government a new copper coinage (of which specimens were forwarded) to consist of:—

VALUE.	Number to the rupee.	Weight: Grains troy.	Diameter, Inches.
Double Pice. ...	32	240	1¼
Single „ ...	64	120	1
Half „ ...	128	60	¾
Quarter „ ...	256	30	$\frac{9}{16}$

"If," the Mint Master wrote, "the machinery of the Calcutta mint could be used in laminating the derabs, it would greatly reduce the expense of making the pice, but I would by no means advise the impression being stamped in Calcutta, as the prejudices of the Natives in Benares should be conceded to."

General.

In a letter dated 10th December, 1806, the Governor General, in forwarding a letter from the Court of Directors concerning a plan for one general coinage for the Company's possession, expressed his opinion that the coins should be struck in the name of the king of Delhí, and not of the Company with their arms, as proposed by the Court. In the letter referred to, of which the following is a *précis*, the Court of Directors wrote as follows:—"We think the Earl of Liverpool* has established the principle that "the money or coin which is to be the principal measure of property, ought to be of one metal only." In applying the argument to a coin for general use in India, there cannot be any doubt, in our opinion, that such coinage must be of silver. The standard weight of the silver coins issued from the mints of our several Presidencies we find to be as follows:—

Calcutta sikka rupee.	Troy grs.			...	179⅔.
Madras Arcot	"	"	" ...	...	176⅖.
Bombay	"	"	" ...	...	179.

"We think it would answer a good purpose to fix the gross weight in whole numbers, and should prefer the weight of 180 grs. troy. The British standard for gold coin is $\frac{1}{12}$ alloy and $\frac{11}{12}$ fine. There is no doubt that $\frac{1}{12}$ alloy of copper would be equally proper for silver coin, and we are of opinion that this proportion should be adopted, in which case the new rupees would have 165 grains of fine silver and 15 grains of alloy. Should the new rupee be ultimately adopted, there may be coined also:—

Half rupee weighing troy grs.				...	...	90.
Quarter "	"	"	"	...	...	45.
Anna "	"	"	"	...	...	11¼.

"A copper coinage should also be determined on for general circulation, and it is our opinion that it should consist of 6 pice or half anna, 3 pice or quarter anna, and 1 pice pieces.

"We are desirous of establishing a gold coin on a principle fitted for general use. This coin should, in our opinion, be called a gold rupee, and be made of the same standard as the silver rupee, *viz.*, 180 grains gross weight and 165 grains fine, and be divided into halves and quarters. The quarter gold rupee appears well fitted to supply the place of the Madras star pagoda in the payment of the Madras army.

"We have thought the adoption of a new coinage for British India a fit opportunity for giving a new impression to our currency, and the most appropriate, in our esteem, is the Company's arms with an inscription "English East India Company," as also the denomination and value of the coin with the year of coinage, and for the reverse a Persian inscription expressing the English one on the obverse with the date of coinage and value and denomination of the coin. If the smaller gold and silver coins (perhaps all below the half rupee) do not present surface sufficient for a clear impression, it would be proper to substitute for the Company's arms the Company's crest, the inscriptions to remain alike in all."

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* Letter to the King on the coins of the realm.

Farrukhábád.

1807. A letter from the Mint Master at Farrukhábád dated 24th October, 1807, asks for new milling dies for rupees, and states that the mint had not yet been furnished with dies for the half and quarter rupees, the expediency of introducing which had been suggested by the Mint Committee.

Madras.

In this year, and early in 1808, proclamations were issued by the Government of Madras respecting a new coinage for the Madras Presidency, of which the following is a *résumé.*

A SILVER COINAGE.

"All the silver coins of the Presidency coined at the Madras mint shall be coined direct from dollars when imported, and be of dollar fineness.

"The double rupee will contain double the quantity, the half rupee half the quantity, and the quarter rupee a quarter of the pure silver which the rupee contains.

"There are also coined and issued the following small coins:—

Five fanams, on which is inscribed their denomination in English, Persian, Gentoo (Telugu), and Malabar (Malayálam).

Three* " " " " "
Two " " " " "
Single " " " " "

B. COPPER COINAGE.

"The Governor General in Council has been pleased to issue a new coinage of the following numbers, values, etc.

Double Dubs.	... 24	to the rupee.
Single "	... 48	" " "
Half "	... 96	" " "
Quarter "	... 192	" " "

"In case the above coins are issued at the Presidency, etc., they are to measure with the star pagodas:—

84 double dubs to one pagoda.
168 single " " " "
336 half " " " "
672 quarter " " " "

"There are also issued the following coins with their denomination inscribed on them in English, Persian, Gentoo, and Malabar:—40 cash, 20 cash, 10 cash, 5 cash."

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* The five fánam pieces are now very scarce. Double and single fánams are fairly common. The three fánam pieces I have never seen, and have met with no other reference to them. I am inclined to think that the mention of them is a mistake.

In this Proclamation, which is dated 22nd August, 1807, it is stated that "the Governor in Council has also deemed it expedient to issue a silver coinage of half and quarter pagodas of dollar fineness."

This Proclamation was repeated on 28th November, 1807, with the addition of a 2½ cash piece as being "also issued."

C. Gold Coinage.

"The Governor in Council, having deemed it necessary to establish a new gold currency, has resolved to coin a gold pagoda of 22 carats fine, and a double pagoda of the same fineness, with English, Persian, Gentoo, and Malabar inscriptions."

Benares.

In August, 1807, the mint master at Benares received a letter from Calcutta respecting a new copper coinage for the province of Benares, which was to be prepared in the Calcutta mint. This coinage should, it was thought, consist of :—

	Number to a rupee.	Calcutta sikka weight.
Double pice	32	1-1-6
Single "	64	0-8-9
Half "	128	0-4-4½

Benares.

1809. By Regulation X, 1809, the Calcutta mint was directed to coin pice for the province of Benares, valued at 64 per rupee.

Madras.

1810. In a letter dated 11th September, 1810, reference is made to "London made copper coins at Fort St. George, of which there is stated to be 80,000 pagodas in store, and which cannot be brought into circulation at that Presidency. We are of opinion that the 20 cash pieces might be circulated here at the value of one and a half of the Bengal pice, and that, in the present scarcity of copper, it would be advisable to send the whole of them to Bengal.

Benares.

1811. A letter dated 16th September, 1811, states that "Government having been pleased to determine that no change shall be made in the local currency of the province of Benares, but that it shall be recognised as the legal currency of that portion of the Company's territories, we entirely concur as to the expediency of placing the mint of that province under the immediate control of the Supreme Government, and of assimilating it in every respect to the mints of Calcutta and Farrukhábád, by which means the coin which may hereafter be struck in the Benares mint will be much improved in point of fabrication and appearance.

The same letter states that "the quantity of gold which has been coined in the Benares mint since 1782 only amounted to 121,949 mohars or about 1,768,260 rupees, whilst, during the same period, the silver coinage has amounted to rupees 51,631,000, and it is accordingly proposed by the Board of Commissioners that the Benares mint shall not be open for the coinage of gold bullion in future."

Benares.

A Regulation for the future management of the Benares mint, (the date[*] of which is not given in the records), has, among its clauses, the following :—

Preamble. Whereas it has been deemed advisable to continue the mint at Benares, and to assimilate the internal management of it to the rules already in force in the Mints of Calcutta and Farrukhábád, the following rules have been enacted to be in force from their promulgation :—

I. The silver coin now current in the Benares province under the denomination of the machhlidár rupee, commonly called the Benares rupee, shall continue to be the established coin of the province, and shall be received as such in all public and private transactions.

II. The Benares rupee is to continue of the following weight, and half and quarter rupees are to be coined of the same standard and proportionate weight :—

Troy grains	175
Pure silver	168·875
Alloy	6·125

III. The Benares rupee shall hereafter be struck of the same size and form as the 19th san rupee struck in the mint of Calcutta, and shall bear the same impression as is now in use ;

IV. The half and quarter rupee shall be proportionately less than the rupee, and shall have the same impression as the rupee ;

V. The edges shall be milled, and the dies (to be cut in the Calcutta mint) shall be made of the same size as the coin, so that the whole impression may appear;

VI. The mint master at Calcutta shall cause a private mark to to be put upon all the dies which may be prepared for the Benares mint.

Java.

1812. In 1812 the Lieutenant-Governor of Java asked that a supply of copper coinage might be sent from Bengal to Batavia, as the want of a small currency was felt throughout the colony. The coinage, it was suggested, should consist of 165 coins to one Dutch pound weight, and the device be either the figure of a buffalo or elephant, and on the reverse, JAVA and the date.

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[*] It was probably 1810, as it refers to "From and after the first day of 1811."

Madras.

In April, 1812, the Madras mint Committee recommended that, in conformity with the orders of the Court of directors, the coinage of half and quarter pagodas and of pie, two, and single fánams be discontinued, and that the coinage of rupees, half, quarter, and eighth rupees be commenced; and that the half and quarter pagodas and five fánam pieces be re-coined into rupees as fast as possible, leaving the double and single fánams to remain in circulation until the fractions of the rupee were fully established.

Benares.

1813. In 1813 it was pointed out that, since the "tirsoolee pisa" was originally established as the copper currency of Benares, no measures had been adopted to renew it, and the inscription had, by process of time, become more or less indistinct, and the shroffs had reduced the value of pice in which the trisúl was defective by reducing it 11 per cent. in current value for no other reason than the defectiveness of the trisúl."

Ceded Provinces.

By a Resolution dated 7th August, 1813, the Governor-General, anticipating great convenience and advantage from the establishment of an uniform coinage throughout the ceded and conquered provinces, including the districts dependent on Delhi, resolved that the coinage to be carried on henceforth at the Delhi mint be confined to new Farrukhábád rupees of the weight and standard of the coin issued from the Farrukhábád mint, and bearing the same inscription. The Governor-General also expressed his opinion that there could be no objection to coining at the Delhi mint a limited number of rupees bearing the name and title of his present Majesty, Akbar Sháh, these rupees being only intended to be presented to His Majesty on the anniversary of his accession for the purpose of being distributed as complimentary presents.

Benares.

In 1813 a Regulation for establishing a copper coinage in the Province of Benares was passed, among the clauses of which were the following:—

I. A copper coin weighing 100 grains troy, and consisting of pure copper, shall be established in the province of Benares (the coin to be fabricated at the Benares mint);

II. The form, size, and impression of the copper coin shall correspond with those prescribed by Sect. XII, Reg. II, 1803, for the Benares rupee, but the edges shall not be milled or have any mark or impression.

Bombay.

In November, 1813, the Court of Directors expressed their opinion that the coinage for the Bombay Presidency should be executed in the Calcutta mint, and forwarded a number of coins as showing their views with respect to manner in which the coinage should be executed.

Farrukhábád.

1816. In September, 1816, the Board of Commissioners, Farrukhábád, pointed out that for some time only a small quantity of silver had been brought to the mint by individuals for coinage, and suggested the expediency of employing the establishment in the coinage of copper pice on account of Government. The following draft Resolution was submitted by the Commissioners :—

I. That Sect. XLIII, Reg. XLV, 1803, prescribing a specified weight for the copper pice to be struck at Farrukhábád be rescinded

II. That such copper coin be struck at Farrukhábád, weighing 200 grains troy for the whole, or double pice, and 100 grains troy for the half or single pice;

III. That such copper coin shall be issued from the mint at the rate of 32 whole and 64 half pice for each rupee.

Mauritius.

In November, 1816, the Mauritius Government wrote to the Governor General that "this Colony is subject to considerable inconvenience and difficulties, especially since the great fire, from the want of a small money for the ordinary daily transactions of common life. It would, therefore, be most desirable to obtain from the mint of the Supreme Government a coinage for the use of this land. A decimal division of the Spanish Dollar, which coin is here equivalent to two sikka rupees, would be the most convenient money for accounts. The books of the merchants and traders being kept in livres, ten of which are in this Colony equal to the Spanish Dollar, it would be desirable that each of the silver coins should be marked ONE LIVRE."

Bengal.

By Regulation XXV, 1817, it was enacted that :—

I. The copper pice struck at the Calcutta mint shall be of pure copper, and of the weight of 100 grains troy;

II. The inscription shall be on one side "one pie sikka" in Bangáli, Persian, and Nágarí, and the date on the obverse.

III. That the pice shall be issued from the mint and public treasuries at the rate of 64 to 1 sikka rupee......, and be legal tender at the rate of 64 to a rupee of the local currency throughout the provinces subject to the Presidency of Fort William.

Benares.
Farrukhábád.

IV. The pice struck at the mints of Benares and Farrukhábád, agreeably to the provisions of Regulation X, 1809, Reg. VII, 1814, and Reg. XXI, 1816, shall be also considered as circulating equally with the pice of Calcutta coinage throughout the above-mentioned provinces, and shall in like manner, be received as legal tender in payment of the fractional parts of a rupee of the local currency at the rate of 64 pice for each rupee.

Farrukhábád.

By Regulation XXVI, 1817, it was enacted that:—

I. Whereas it may from time to time be found expedient to coin rupees of the weight and standard of the Farrukhábád rupee at the mints of Calcutta or Benares, it has seemed advisable to rescind so much of section II of Reg. XLV, 1803, as tends to limit the coinage of Farrukhábád rupees to the mint of Farrukhábád, and to direct that the following enactment be henceforth in force:—

II. The silver coin denominated the Farrukhábád rupee, and of the weight and standard prescribed by section II of Reg. III, 1806, struck at the mints of Calcutta, Farrukhábád, or Benares, or at any other mint established by order of the Governor General in Council, is hereby declared to be the established and legal silver coin in the ceded and conquered provinces.

Calcutta.

In 1817 the weight of the pice struck in the Calcutta mint was fixed at 100 grains, and they bore the inscription "one pie sikka."

Delhi.

1818. In June, 1818, the Vice-President in Council expressed his concurrence with the Resident at Delhi as to the inexpediency of maintaining the Delhi mint, and the Resident was accordingly directed to discontinue its operations, still causing, however, such a number of coins to be struck as might be necessary for the purpose of satisfying the feelings of the king.

General.

In August, 1818, the Calcutta Mint Master submitted for the consideration of Government specimen coins of the weight and standard of the proposed new currency, and stated that, as the difference in size and weight of the new coins might not be considered sufficient to enable all persons to at once distinguish them from the old ones, he had thought it expedient to affix such further distinctive marks as would be obvious to the most ordinary observer. The specimens, which were distinguished from the existing currency by a raised rim and perpendicular milling, were adopted as the pattern for the new coinage.

In 1818 the Calcutta Mint Committee stated that they were not aware of any objection to the inscription on the rupee undergoing an alteration, and that it would be more consistent with the dignity of the British Government of India to authorise its own currencies by its own peculiar stamp and impression; and suggested that, if any alteration was made, no date should be inserted, as an arbitrary batta on coins of various issues would thus be obviated without having recourse to any fictitious inscription.

Benares, Farrukhábád.

1819. By Regulation XI, 1819, it was enacted that :—

I. The coinage of the Benares rupee shall be discontinued;

II. The Farrukhábád rupee shall be considered the legal currency of the province of Benares;

III. The Farrukhábád rupee shall be a legal tender in all the territories under the Bengal Government, wfth the exception of Bengal, Bihár, and Orissa, whether struck at the mints of Calcutta, Benares, or Farrukhábád, or any other mint that may be hereafter established within the aforesaid limits under the authority of the British Government;

IV. The Farrukhábád rupee to be struck at any of the mints before mentioned, shall be of the value of the present Farrukhábád rupee, and of the standard of the present Calcutta rupee, *viz.*:

Weight	Troy grs.	180·234
Pure silver	,,	165·215
Alloy	,,	15·019

In addition to the substitution of the new Farrukhábád rupee, the Mint Committee recommended the temporary establishment of mints at Ajmere and Ságar, to convert the existing currencies into the new coin. The Ságar mint was at that time issuing rupees called "Saugor or Balashaie." The Government expressed their opinion that the recommendation of the Committee was judicious. I can find no further reference to the Ajmere mint in the records.

Ajmere, Ságar.

Bombay.

1821. The Bombay coinage consisted in 1821 of the following :—

		Troy grs.
Gold.	Mohar	180
,,	Panchia (5 rupees)	60
,,	Rupee	12
Silver.	Rupee	180
,,	Half Rupee	90
,,	Quarter ,,	45
,,	Eighth ,,	22·5
Copper.	Anna	400
,,	Half Anna	200
,,	Quarter ,,	100
,,	Pice	33·33

Mauritius.

In this year the Mauritius Government, being put to inconvenience by the use of paper money for the small change of the colony, asked that the Calcutta mint might coin for them small tokens to the value of 100,000 sikka rupees. The wish of the Mauritius Government was acceded to.

Singapore.

1824. In 1824 an application was made by the Resident at Singapore for a supply of small coins to be struck at the Calcutta mint for the use of that settlement. In the Resident's letter it is stated that the small money in circulation throughout the Malay countries consisted of copper Dutch duyt and pice of Prince of Wales' island, the brass coin of China, and of silver Dutch 2, 6, and 9 silver (stiver ?, pieces, and the guilder or florin commonly called by the natives the rupee. The most universally used coins were the duyt and two stiver piece. The duyt was the real money of the most remote and unfrequented parts of Sumatra and Borneo, and the two stiver piece was the true circulating medium of the Celebes, the Spanish dollar being only used in foreign commercial transactions. It was suggested that the duyt and two silver piece should be struck with the same inscriptions, *viz.* the value in the English, Chinese, Malay and Bugies languages, and on the reverse the crest of the East India Company without the supporters, and with the date and motto of the Company beneath.

Ságar.

By Regulation II, 1824, it was decided that the Farrukhábád rupees, to be coined at the Ságar mint of 180 grains, 165 fine and 15 alloy, should be the legal currency of Ságar and territories on the Narmadá (Nerbudda).

Bombay.

A letter from the Bombay Mint Committee, dated 27th September, 1824, refers to a communication received from the Supreme Government, desiring that immediate steps be taken for the coinage of a new rupee of the Madras standard, and asking for their opinion on the measures to be adopted for a general reform of the currency. The Committee suggested, with reference to the first point, that a proclamation should be issued, announcing the alteration of the standard, and declaring the new rupee current at par with the old. They also recommended the division of the anna into sixteen instead of twelve pice, so that the copper currency would consist of:—

	Troy grs.
Anna	400
Half Anna	200
Quarter „	200
Double Pice	50
Single „	25

A draft proclamation was submitted by the Committee, announcing the alteration of the mint standard, the sanction of which by the Supreme Government is not recorded in the Records.

General.

1825. In 1825 various suggestions for a change of impression on the currency were made, and the following extract is from an able report by Lieutenant Forbes, who was superintending the construction of the new Calcutta mint, and who, before proceeding to England in 1820, had been instructed by the Bengal Government to bring the subject of the device for the coin to the notice of the Court of Directors.

"It is observed," Lieutenant Forbes wrote, "that the impression chosen by the king of Oudh for his new currency shows that in reality no prejudice exists against the representation of animals on coins. The common practice of putting Coats-of-Arms on coins having led to the adoption of those of the Hon. Company as a device for some of their copper coins executed in England, the propriety of employing them on the money to be struck for the general circulation of India came first to be considered. From the minuteness of the scale to which they must be reduced on a coin, it was found that the Royal Arms situated in the upper left quarter of the Company's shield became undecipherable, and that, as its plain was otherwise blank, the total effect of the piece was feeble and unmeaning. With the intention of enriching the design, two large lions (the supporters), and a little one (the crest), were introduced. The portion of surface occupied by such a number of animals in the rampant and strange attitudes adopted in heraldry, now left so little space for the shield that the Royal Arms, diminished to a peg, became utterly undistinguishable. The unanimous opinion of artists that such a device would appear inelegant and barbarous was strikingly confirmed by the specimens produced on the money executed at Soho for transmission to Penang and the islands to the eastward. Although some of the dies were engraved by artists of considerable talent, no effort of skill or ingenuity could prevent the little odd lion of the crest from being mistaken for a monkey, nor obviate the misapprehension of common observers in conceiving the figures used as supporters to be ill-designed cats. A praiseworthy attempt to correct such serious defects by the introduction of lions modelled from life brought the question of the Arms to its final issue. It then appeared that the animals with which heraldry is conversant under the denomination of lions are not "real lions," and that correct similitudes of the animal himself, placed in the splay-footed position, required as supporters, had a ludicrous effect.

"I was induced to propose the simple emblem of the Company, a a solitary lion, as a devise for the Indian coins. As an appropriate type of sovereignty, and as an emblem known and respected wherever British rule has been extended, I suggested that the ease, dignity, and strength which he so nobly personified on some of the coins of ancient Greece would be still more consistent and characteristic when applied to India. Moreover, I suggested that he might be completely localised by the ever-flourishing Palm, an Asiatic though ancient tasteful emblem of perpetuity.

"I have to solicit the attention of the Committee to a model of this devise executed after a drawing by Flaxman."

It was agreed that this device was well adapted for one face of the new coin, and suggested that either the head of the King (George IV), or the designation of the coin within a wreath, should be placed on the other face.

Delhi.

1826. In 1826 the Collector of Delhi expressed his opinion that a proposal to establish a mint for copper coinage at Delhi would be productive of good to the people, and a check to the impositions practised by the shroffs, whose source of livelihood consisted in the exaction of discount on the various current copper coins.

Calcutta.

1823–27. A volume of the records, 1823–27, is devoted to details connected with the construction of the new Calcutta mint.

In a report on the regulations for the conduct of the coinage subsequently to its transfer to the new Calcutta mint it is recorded that:—

I. It was the intention of the Hon. Court that the scale of the new mint machinery and establishment should be such as would permanently enable it to supply two-thirds of the coin required for the circulation of India;

II It was their design that the remaining third should be supplied by similar apparatus of half the power to be sent to Bombay;

III. The new Calcutta mint would immediately or eventually have to perform the work of the Calcutta mint, and of the mints of Benares, Farrukhábád, and Ságar;

IV. The Hon. Court held in view that the Calcutta and Bombay mints would, at any period found convenient, afford the means of equalising the coins, and of rendering uniform the coinages of India.

Bombay.

1827. In a letter dated 28th August, 1827, the Mint Master of the "new mint," Bombay, expressed his opinion that the Bombay division into rupees, quarters, and reas was preferable to the rupees, annas, and pie of the other side of India, and that the division of the gold mohur into fifteen parts was decidedly superior to the Calcutta division into sixteen.

Spelter money.

1829. In 1829 it was suggested that the new Calcutta mint might be usefully employed in coining spelter money, which would be very useful to the poorer classes as a substitute for cowries, and which might be called the quarter or páo pice.

Delhi.

The question of the re-establishment of the Delhi mint for the coinage of pice only was re-opened.

Benares.

1830. In a letter dated 2nd February, 1830, the Calcutta Mint Committee was informed that the Governor General authorised the discontinuance of the establishment of the Benares mint, and the disposal of the machinery, apparatus, and other property of that mint.

General.

In May, 1830, a letter was submitted by the Calcutta Mint Committee on the subject of the impression of the new coinage, and reiterating their opinion that the British Indian currencies should bear impressions characterising the authority by which they were issued either in the form of a head, emblem, or coat-of-arms. The Committee, in the same letter, expressed their opinion that, until this question was settled by the Court of Directors, the Bombay coinage should continue to bear the same impression as it did at present. In a further letter, submitting specimens of two Franc pieces, the Committee stated that the French milling could not be advantageously introduced with the existing milling machinery, and recommending that a plain milling should be adopted.

Calcutta.

In August, 1830, the Calcutta Mint Committee submitted specimens of copper pice with a request that Government would sanction their coinage, as they seemed to be preferable to those in circulation at that time.

In December of the same year the Calcutta Mint Master suggested that a copper coinage might with advantage be carried out at the new mint for the Madras Presidency and the settlements to the eastward (Singapore, etc.,) in which latter the demand for copper coin was at that time very urgent.

Ságar.

1831. A letter dated 11th January, 1831, stated that it had been resolved to abolish the mint at Ságar.

By an order dated 25th February, 1831, it was notified that "an alteration in the Calcutta sikka and Farrukhábád rupees was authorised by the Governor General in Council under date 13th July last, and that these currencies will in future be struck at the Calcutta mint with a plain flat milling only."

Bengal.

In August, 1831, the Calcutta Mint Committee submitted the following draft of a Regulation for legalising the circulation of the sub-divisions in the copper currency authorised to be coined by Government:—

I. That, besides the copper pice now current, which shall remain unchanged, there shall be coined a copper half-anna piece, and a copper pie or twelfth of an anna;

II. The copper half anna pie shall weigh twice the weight of the present pice, or 200 grains troy, and shall bear on one face the legend "Half anna" in Persian, and Nagárí, and on the other the same in English and Bangálí. The exchangeable value of the coin shall be two for one anna, or one for two pice;

III. The twelfth of an anna piece on one pie shall weigh troy grains 33·333, and shall bear on one face the legend "One páí" in Persian and Nágarí, and the same on the other in English and Bangálí. The exchangeable value of the coin shall be twelve for one anna or three for one pice.

IV. These coins shall be current at the above rates in all the provinces under the Bengal Presidency.

Rupee coinage.

1833. In a letter from the Assay Master of the Calcutta mint (Mr. Prinsep) in April, 1833, some general information is given with reference to rupee coinage. "It has ever," he says, "been the expressed desire of the Hon. Court of Directors to equalise the coin of the whole of the Indian possessions both in weight and standard. In this they have but followed the laudable practice of the Muhammadan Governments of India, which, while they arrogated to themselves the prerogative of coining, appear to have maintained with care and good faith the weight and purity of the circulating medium until the Empire was distracted with internal commotions, and the Viceroys of the Crown and tributary states assumed to themselves the control of the various mints, reserving a mere nominal subjection to the sovereign in the legend impressed upon their coin.

"The silver rupee was introduced, according to Ab-ŭl-faẓl, by Sher Sháh, who usurped the throne of Delhi from Humáyún in 1542. It had a weight of $11\frac{1}{4}$ máshás, which, at the rate of $15\frac{1}{2}$ grains per máshá, is equal to 174·4 grains of pure silver. This standard was adopted by Akbar, and accordingly we find coins of his reign weighing from 170 to 174 grains.

"The Murshidábád rupee was adopted for the coinage of the Company's súbah of Bengal, and has accordingly remained unchanged as the present sikka rupee.

"The Súrát rupee was also adopted as the currency of the Bombay Presidency under the treaty with the Nawáb of Súrát, who retained the privilege of coining; but in 1800 its pure contents were found to have sunk to 164·79 grains, when, to prevent further depreciation, the Government assumed charge of the mint, and the rupee was then fixed at the later valuation of 164·7 grains pure.

"The Delhi rupee struck at the Fathgaṛh mint by the Vizier of Oudh, in like manner, gradually diminished to 165·2 grains pure, when, by cession of the Duáb to the English, it was there arrested, and by a Regulation of 1806, was assumed as the standard currency of the Western Provinces. It was afterwards introduced into the Benares Provinces, where, (that mint having come earlier into our possession), the depreciation of the rupee has not reached the same extent: pure contents 169·2.

"The Arcot rupee in 1788, according to the assay tables, still retained 170 grains of pure silver. When adopted, however, as the standard rupee of the Madras Presidency, it had fallen to 165 grains, and there of course it has since remained.

"The alteration of the standard to $\frac{1}{12}$ of alloy in 1818 did not affect the proportion of pure metal, but the facility of equalising the three coins (Bombay, Madras, Farrukhábád) had been observed both in England and India; and, when the Ságar mint was established in 1825, it was ordered to coin new Farrukhábád rupees of 180 grains weight, the same as the standard of Madras, or containing 165 grains pure. The Bombay mint was ordered to assimilate its coin to the same in 1829. The Benares rupee alone continued to coin Farrukhábáds of 180·234 grains until its abolition in 1829; and the Calcutta mint has since coined them of the same weight, although a good opportunity was afforded by the promulgation of the new system in Bombay to have effected a simultaneous reform here."

In the letter under notice Mr. Prinsep recommended (and Government saw the expediency of adopting the recommendation)[1] that:—

I. The weight of the Farrukhábád rupee struck at the Calcutta mint be 180 grains troy instead of 180·234 grains; and that the weight of the Calcutta sikka rupee be 192 grains instead of 191·916, corresponding alterations being made in the half and quarter rupee.

II. The sikka weight (contra-distinguished to the sikka rupee) be equalised with the weight of the Farrukhábád rupee.

Calcutta.

In October, 1833, Mr. Prinsep recommended that the armorial bearings impressed on both the Bombay and Madras copper coins, should be immediately adopted at Calcutta and that on the reverse should be the value in English, Nágarí, and Persian, enclosed in a wreath. "The determination of this point," Mr. Prinsep said, "is the more urgent as it is now in contemptation to issue a large copper coin to replace the tirsoolee pice."

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[1] Reg. VII, 1893. See Thurston, *op. cit.*

General.

1834. In April, 1834, the following recommendations were submitted for the consideration of Government:—

I. That there should be a common device for the coins of the three Presidencies;

II. That this should differ on the three metals, so as to fully distinguish them from one another, and prevent fraud and imposition by gilding or silvering;

III. That the device should be pictorial and essentially English, as, among other reasons, the adoption of such a device would entitle the Government to claim from the Colonial Governments of the Crown a recognition of the coin of India as a national money entitled to circulate at its intrinsic value in all the possessions of the Crown. The rupee in its present form is not so considered beyond the limits of the Company's authority.

IV. That the gold mohar of Bengal should in future be equalised with that of Bombay and Madras;

V. That the coinage of the sikka rupee should be discontinued from the commencement of the new Charter, so as to prevent all confusion from the two coins being permitted to circulate together.

A specimen coin, executed by a native named Kásináth, was submitted with the letter. The obverse bore a facsimile of the king's head on the English Sovereign, and the legend GULIELMUS, IIII. D. G. BRITANNIARUM, REX. F. D., and the reverse a laurel wreath with ONE RUPEE. 1834. in the centre, and the same in Persian, Bangálí, and Nágarí on the margin. This device, with the substitution of MOHUR, was recommended for the gold coinage. Mr. Prinsep had already suggested that the copper coins should bear on the obverse the Company's Arms, and on the reverse a wreath with the designation of the coins in lieu of the word "adil" of Bombay or "ek falús panch kás ast" of Madras. The recommendations of the Committee were referred to the Court of Directors.

Various designs for the new coinage by Mr. Prinseps were also submitted, *viz*:—

I. Britannia from the English penny;

II. A lion from an ancient Greek coin;

III. An elephant (from the Ceylon coin);

IV. A ship;

V. A British senator, between a Hindu and Mahommedan, presenting the charter;

VI. An emblematical figure of Justice and Plenty;

VII. Typical figures of Britannia and India;

VIII. The Pípal tree (*Ficus Indica*) from the seal of the Royal Asiatic Society of London.

General.

1835. Early in 1835 engravings were prepared of the head of the king with the simple legend WILLIAM, IIII. KING, instead of the titles in Latin, and an impression in pure gold of the King's head with the lion as the reverse (proposed as a double mohur) was submitted.

In April, 1835, the Calcutta Mint Committee was informed that the rupee having on one side the inscription EAST INDIA COMPANY, with the nominal value of the coin in English, Persian, and Nágarí, and the representation of a lotus flower and myrtle wreath had been approved by the Governor General as the model for the future coinage of the rupee. The Committee were requested to communicate with the Madras, Bombay, and Ságar mints with the view of effecting a change in the rupee currency throughout British India with all convenient expedition. In a subsequent letter, however, it was resolved that on the obverse of the new silver coinage the title of the king should be simply WILLIAM, IIII. KING, and that on the reverse should be engraved the denomination of value in English and Persian only.

Madras.

In June, 1835, it was resolved by the Governor General to abolish the Madras mint in conformity to the orders of the Court of Directors, and the Madras Government was desired to forward to Calcutta or Bombay such parts of the mint machinery as, if publicly sold, might be employed in fabricating coins.

Ságar.

In September of the same year, it was resolved that the Ságar mint should be abolished, as it was no longer considered necessary for supplying coin of the new legal currency with reference to the capability of the Calcutta and Bombay mints for the whole coinage of India.

Bengal.

In October the Calcutta Mint Committee submitted specimens of a device which they thought suitable for the copper coinage of Bengal, *i. e.*, on the obverse the Company's Arms as on the pice of Bombay and Madras, and on the reverse the denomination of the coin in English and Persian enclosed in a wreath, and the title of the Hon'ble Company on the margin in correspondence with the device of the new rupee. This device was adopted.

General.

A letter from the Government, dated 25th November 1835, states that "under the circumstances represented, from which it appears that it would lead to considerable further delay to prepare and execute a new device for the gold coin proposed to be issued (with the name of the coin in English within a wreath instead of the lion,) whereas the coinage of double mohurs can be immediately commenced if the die cut with the device according to the design of Flaxman be adopted, the Governor General has been induced to waive his objection to the representation of an animal upon the gold coin of India, and to approve the adoption of this device."

The details of the new coinage were finally laid down by Acts XVII and XXII 1835.

Græco-Roman Influence on the Civilization of Ancient India. Supplementary Note.—By Vincent Arthur Smith, M. R. A. S., *Indian Civil Service.*

Sir Alexander Cunningham has favoured me with communications which enable me to make certain corrections in and additions to my second paper on Græco-Roman Influence on the Civilization of Ancient India, published in the Journal of this Society for 1892[1].

Concerning the short record dated in the year 68, and numbered II. by M. Senart, I remarked (*page* 56 *of my paper*) :—"It is not known to what object it was attached, but doubtless it was a sculpture of some sort." M. Senart's words are (*page* 21 *of his paper*):—"Le lieu d' origine de cette courte inscription ne m' est pas connu. Il est probable que, comme presque tous les monuments réunis au musée de Lahore, elle vient du pays des Yusufzais, sur la rive gauche du fleuve de Caboul, de Jamalgarhi, de Takht i Bahi, ou des environs.

Les caractères occupent une longueur de 97 centimètres; on peut en estimer à 3 centimètres et demi la hauteur moyenne. La hauteur de la pierre est de 10 centimètres. Ignorant jusqu' à sa provenance, nous n' avons bien entendu aucun renseignement sur l' objet qu' elle accompagnait primitivement."

Sir A. Cunningham, in a letter dated 17th June, 1892, clears up all doubts as to the place from which the inscription came, and proves that I was mistaken in guessing that it had been directly attached to a sculpture of some sort.

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[1] See J. A, S. B. Vol. LXI, Part I for 1892, p. 50 Ed.

He writes:—"Regarding the inscription of S. 68 published by M. Senart, I can say that it was on a very large rough stone, which may have been inserted in a wall, but which could not have been the base of a statue. It was 5 feet 9 inches long, and from 3 feet to 1 foot 9 inches in breadth. The legend was on the edge. It weighed 12 maunds 7 seers [= 1008 lbs. avoirdupois, = 457 kilogrammes], when I got it, but I cut it down to 4 maunds 3 seers, before sending it to the Lahore Museum, where, as I conclude from your account, it is left unregistered as presented by General Cunningham—from Máji, 4 or 5 miles to the south of Fatehjang, ancient Chása, and to the south-west of Ráwal Pindi."[1]

The inscription is certainly in the Lahore Museum, because M. Senart expressly states at the beginning of his essay that all the monuments described by him belong to that museum, and were communicated to him by the curator, Mr. L. Kipling.

Concerning the dated Hashtnagar inscription (*page* 55 *of my paper*) Sir A. Cunningham says that "The date may be either 274 or 284, but it cannot, I think, be referred to 78 A. D." I have already given up the suggestion to refer this date to the S'aka era, and have assumed that the approximate date of the inscribed pedestal is A. D. 220 or 230. Sir A. Cunningham observes that the Panjtár inscription of a Gushán, or Kushán, Mahárája, dated S. 122 is the latest "which can be referred to A. D. 78." If that record is rightly referred to the S'aka era its date will be A. D. 200, which is not far from the approximate date obtained for the Hashtnagar inscription by using the era of Moga or Gondophares. I think it may now be safely assumed that the use of the Gandharian (Kharoshṭrí) character in Gándhára survived into the first half of the third century A. D. The disuse of this character in India proper does not imply its disuse in Gándhára. It is, no doubt, true that the Gandharian character is not used on the coins of Vasudeva, of whom we have an inscription in old Nágarí characters dated S. 98, = A. D. 176, and that coins of Kanishka (KANHPKO) and Vasudeva (BAZOΔHO) which Sir A. Cunningham believes to be posthumous, bear legends in old Nágarí. But I see no difficulty in believing that at the same time the Gandharian character had a limited local currency for some purposes within the region of Gándhára.

When quoting (*page* 59) Prof. Rhys Davids, as authority for identifying the "village" Kalasi in the "island" of Alasanda, where king Milinda (Menander) was born, with the *Karisi nagara*, or town of Karisi mentioned on a coin of Eukratides (*circa* B. C. 190), I was not aware that the identification had been made long before by Sir Alexander Cunningham, who published it in the Numismatic Chronicle for 1869, and again two years later in his 'Ancient Geography of India.'[1]

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[1] For a notice of Fatehjang, see Archæological Survey Reports, Vol. XIV, p. 24.

Sir Alexander Cunningham is of opinion that in the passage quoted by me from Prof. Rhys Davids' translation of the 'Questions of king Milinda,'—"There is an island called Alasanda. It was there I was born,"—the word *dípa* (Sanskrit *dwípa*) should be translated 'region' or 'division of the world' rather than 'island.' He cites in support of this rendering the well known compound *Jambúdwipa*, and takes *Alasandadípa* to mean "the country of which Alasanda was the capital," Kalasi being "the same as Alasanda itself."

If, in the passage quoted, the word *dípa* does not mean 'island', there is, apparently, no reason for supposing the Alexandria in question to have been on the Indus. Sir A. Cunningham places it, as will be seen from the passage to be quoted presently, at a village named Opián or Hupián, 27½ miles north of Kábul. Whatever be the true position of Alexandria or Alasanda, Prof. Rhys Davids' note at page 127 of the 'Questions of King Milinda' referring to "Alexandria (in Baktria) built on an island in the Indus," is not quite accurate. The Indus was never included within the limits of Bactria, though the banks of the river may at times have been included in the dominions of the Bactrian kings.

My quotation *(same page)* from Professor Percy Gardner was also unfortunate. He describes the legend on the rare coin of Eukratides, giving the name of the town of Karisi as being "the conjectured reading of General Cunningham." This remark is inaccurate. The only word at all doubtful in the reading of the legend on the coin referred to, was *devata*, and the reading of this word has lately, Sir A. Cunningham assures me, been definitely established by a second specimen of the coin. The reading of the name 'Karisi' on the coin was never doubtful.

In order to prevent any further misconception, and to show clearly Sir A. Cunningham's views concerning the probable situation of Alexandria, = Alasanda or Alasadda, = Kalasi, presumably identical with Karisi, I had better quote in full the relevant passage from the 'Ancient Geography of India,' page 28, which is as follows :—

"If I am right in identifying Begrám with the Kiu-lu-sa-pang of the Chinese pilgrim, the true name of the place must have been *Karsana*, as written by Ptolemy, and not *Cartana*, as noted by Pliny. The same form of the name is also found on a rare coin of Eukratides, with the legend *Karisiye nagara*, or 'city of Karisi', which I have identified with the *Kalasi* of the Buddhist chronicles, as the birthplace of Raja Milindu. In another passage of the same chronicle,[1] Milindu is said to have been born at *Alasanda*, or Alexandria, the capital of the *Yona*, or Greek country. Kalasi must, therefore, have been either Alexandria itself, or some place close to it. The latter conclusion agrees exactly with the position of Begrám, which is only a few miles to the east of Opián. Originally two distinct places, like Delhi and Sháh Jahánábád, or London and Westminster, I suppose *Opián* and *Karsana* to have gradually approached each other as they increased in size, until at last they virtually became one large city. On the coins of the earlier Greek kings of Ariana,—Euthydemus, Demetrius, and Eukratides,—we find the monograms of both cities ; but, after the time of Eukratides, that of Opiana disappears altogether, while that of Karsana is common to most of the later princes. The contemporary occurrence of these mint monograms proves that the two cities were existing at the same time ; while the sudden disuse of the name of Opián may serve to show that, during the latter period of Greek occupation, the city of Alexandria had been temporarily supplanted by Karsana."

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[1] Prof. Rhys Davids informs me that he also was unaware that Sir A. Cunningham had made the identification previously, and will gladly take the opportunity of the impending publication of the second volume of the 'Milinda' to acquaint his readers with the fact.

The Alexandria above referred to is the city founded by Alexander, and described by Pliny as "Alexandria Opianes", situated "sub ipso Cancaso". The modern name of the site identified with it is said to be variously spelled Opián, Opiyán, and (Malik) Hupián.

The Maháwanso calls Alasanna "the city, or capital, of the Yona country", *Yona naggarálasanna*. (*Turnour*, page 171). Turnour himself writes the name as Alasadda.

I have not specially studied the ancient geography of Ariana, and therefore abstain from pronouncing any personal opinion on the geographical questions raised in the preceding extracts.

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[1] *Milindu-praṣṇa*, quoted by Hardy, in 'Manual of Buddhism', pp. 440, 516.

Uriyá Inscriptions of the 15th and 16th centuries.—*By* BÁBÚ MON MOHAN CHAKRAVARTI, M. A., B. L., *Subordinate Executive Service of Bengal.*

These inscriptions are 14 in number; 12 on the left and right side of the Jayavijaya door-way in the temple of Jagannátha at Purí, and 2 on the right side of the door-way in the temple of Mahádeva at Bhuvaneśvara. They furnish important dates of Orissa history, and are the earliest known Uriyá writings found in Orissa.[1]

The Jayavijaya door is that which leads into the Porch of the Jagannátha temple. The inscriptions are carved on the door-way. This door-way is of black polished *chlorite.* The left side inscriptions begin from a height of three feet, the right side ones from a height of one foot. They then take up about $\frac{3}{4}$th of the remaining height. The lines run from west to east, and are nearly, but not always, straight.

The letters are Uriyá, and do not generally differ from the present types except in च, ज and र. They are $\frac{1}{4}'' \times \frac{1}{3}''$. The language is throughout Uriyá except at the end of the right side 5th inscription, where are quoted 4 stanzas of Sanskrit slokas. The orthography is often incorrect. The grammatical differences are small.

The inscriptions belong to four reigns, *viz.*,

(1) Kapileśvara Deva	5
(2) Purushottama Deva	4
(3) Pratáparudra Deva	2
(4) Mânagovinda Govinda Deva	1
	12

The above sequence denotes the natural order of the kings in their succession; Kapileśvara Deva being the founder of the Súrya-vaṁśa and Govinda Deva being the overthrower of that dynasty.

The inscriptions begin with an enumeration of the various titles of the inscribing king. It is curious to observe that these titles increase in number and pomposity, the later we come. All these titles are still used by the Rájá of Purí, and may be found on the title-pages of Uriyá almanacs.

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[1] A transcript of these 12 inscriptions, and a translation of tenth, have been given by Dr. R. L. Mittra, in his Antiquities of Orissa, Vol. II, Appendix, pp. 165–167. My readings of the same and my translations differ considerably; hence this article.

Next come the dates. The phraseology of the dates is peculiar. Take No. 1 of left side :—

"*Prabardhamána bijé rájye samasta* 3 *anka Sráhí Magúsir kru troyodasí Bhúmi bare*" =

On Tuesday, the 13th (tithi) of Margasir dark half in the third anka of the prosperous victorious reign of —.

Samasta means here "during."

Sráhí is a technical word, but has no particular meaning in the context.

The dates are of luni-solar months expressed in tithis of dark or bright half. The ankas are regnal years and something more. Certain figures are considered inauspicious and left out in counting. These figures are one, all numbers ending with zero (except 10), and ending with six. 1, 6, 16, 20, 26, 30, &c., should be left out of consideration in calculating the ankas. Hence 19th anka=16th year, 31st anka=25th year, and so forth.

To be of any practical use, the ankas and tithis require conversion into English calendar dates. Below are given the equivalent calendar dates arrived at in the following manner. From Madalá Pánji,[*] is found out the approximate year of the king's accession. Add the regnal year derived from the anka. The tithis are given as well as the week days. According to Professor Jacobi's Table (Part CCIX, Vol. XVII of the Indian Antiquary), the year in which the tithi in question fell on the stated week-day can then be easily found. Generally this year is within 20 years of the approximate year. These dates are next verified. The sources of verification are—

(1) The dates of the other inscriptions ;
(2) The Muhammadan histories ;
(3) The biographies of Chaitanya ;
(with respect to the reign of Pratáparudra Deva).

I. KAPILEŚVARA DEVA.

Inscriptions.	Uriyá dates.	Equivalent calendar dates.
1. Left, No. 3 ...	4th anka dhanu new moon, Sunday	= 9th December, 1436 A. D. (O. S.)
2. Left, No. 4 ...	41st[†] anka dhanu sukla 7, Sunday	= 14th December, 1466 A. D. (O. S.)

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[*] Mádalá Pánji is the chronicle of the temple of Jagannátha. Hitherto it has been almost the only source for the history of Orissa in the Hindu period.

[†] A mistake for 39th.

3. Left, No. 5 ... 35th anka Mesha Kṛishṇa 4, Wednesday = 25th April, 1464 A. D. (O. S.)
4. Right, No. 2... 19th anka Mesha new moon, Sunday = 12th April, 1450 A. D. (O. S.)
5. Right, No. 3... 31st anka Kakrá sukla 12, Thursday = 12th July, 1459 A. D. (O. S.)

II. PURUSHOTTAMA DEVA.

1. Left, No. 1 ... 3rd anka Márgasir Kṛishṇa 13, bhaumibár = 20th Nov. 1470 A. D. (O. S.)
2. Left, No. 2 ... } 2nd anka Mesha, sukla
3. Right, No. 1... } Thursday = 12th April, 1470 A. D. (O. S.)
4. Right, No. 4... 19th anka Siṃha, sukla 8, Thursday = 18th August, 1485 A. D. (O. S.)

III. PRATÁPARUDRA DEVA.

1. Left, No. 6 ... 4th anka kakrá, sukla 10 Wednesday = 17th July, 1499 A. D. (O. S.)
2. Left, No. 7 ... 5th anka dhanu 3 (?) Kru (?), Monday = ?

IV. GOVINDA DEVA.

1. Right, No. 5... 4th anka bichhá, sukla 3, Tuesday = 7th Nov. 1542 A. D. (O. S.)

INSCRIPTIONS IN THE TEMPLE OF JAGANNÁTHA.

Left side.

No. I.

Length 4′–6″ × 10″—Lines 5.

L. 1 वीरश्री गजपति गौड़ेश्वर नवकोटी कर्णाट कलवरकेश्वर प्रताप श्रीएषोत्तम
2 देव माहाराजाङ्क प्रवर्द्धमान विजेराज्ये समस्त२ अङ्क आही मगुसिर क

3 त्रयोदसि भुमिवारे श्री पुरुषोत्तम कटके आइगां होइला दखिणदिगर
4 दण्डोआसि ओहोर आम्भे ब्राह्मणङ्कु छाड़िलु दण्डागोपथहरणहि छाड़िलुं
5 एहा ये हरइ से हरिला दोष पाइ ।

Translation.

On Tuesday, the 13th (tithi) of Margasir dark half of the 3rd anka of the prosperous and victorious reign of the warrior, elephant-lord, king over Gauḍa and the ninety millions (subjects) of Karṇáṭa and Kalabaraka (probably Kulbargá), of the powerful Purushottama Deva Maháràja, while at camp Purushottama, (*i. e.*, Puri) it was ordered :—I remit the levying from the Bráhmans of the Chaukidárí Tax (Daṇḍo-ási Ohor) in the south ; I cease to resume the waste lands and the pastures ; he who takes, gets the sin in theft.

Left side.

No. II.

Length 4′–8″ × 1′–9″—Lines 11.

L. 1 वीर श्री गजपति गौड़ेश्वर नवकोटी कर्णाटकलवरगेश्वर प्रताप श्री पुरुषोत्तम देव माहाराजाङ्क समस्त
2 २ आङ्की मेस सु १२ ग्रवारे श्रीपुरुषोत्तम कटके विजे समए पुरुषोत्तम देव माहाराजाङ्कर दत्
3 दखिणदिगदण्डपाटे श्रीपुरुषोत्तम जगन्नाथदेवङ्कर एथामान देग्रमानर दखीणदिग अवदान सेवक
4 ठुर देग्रमानर प्रमेश्वरङ्क भोगदेग्रमान अवदान प्रमेश्वरङ्कु नि (?) द्रालु (?) सेवकमानङ्कु
5 अवदान सेवकमानङ्कु छाड़िलि ए एषोत्तम देव माहाराजाङ्क भोगकु अन्तरोधविषे माधोतिल ग्राम
6 धान भ ५०० कउड़ी का २००० कामलपुर ग्राम ए भोगकु होइला परव देदिखं माजना
7 (7 letters illegible) महादेवङ्क भोगकु दत्तीग
8 दीग दण्डपाटे वाँआचास विसे गोप
9 पुर ग्राम दिलि ए अवदानमान ए भोग
10 देग्र जे हरइ से जगनाथङ्कु द्रोह
11 करइ ।

Translation.

On Thursday the 12th (tithi) of Mesha bright half of 2nd (anka) of the warrior, the elephant-lord, the king over Gauḍa and the ninety millions in Karṇáṭa and Kalabaraga, of the powerful Purushottama Deva Mahárája while encamping at camp Purushottama, the (following) gifts of Purushottama Deva Mahárája in Dakshiṇadiga daṇḍapáṭa:—(1) for god Jagannátha of Purushottama, a gift of the old mála tracts in the south; (2nd) for the bhoga of the god a gift of lands out of the lands of the sevaks; (3rd) gifts to the priests engaged in sleeping (?) the god, (these) I leave to the sevaks. As offerings of Purushottama Deva Mahárája (personally,) for bhoga, the village Mádhotila in Antarodha Bisi, paddy 500 bharans, cowries 2,000 káháns and the village Kámalpur—these are for the bhoga. For the festivals, &c., of other gods, goddesses and the Mahádeva I bestow the village Gopapura in Bánchás Bisi of Dakshiṇadiga Daṇḍapáṭa. These gifts, these lands, he who takes away, rebels against Jagannátha.

Note.

Purushottama Deva got on the throne after a civil war. In this inscription, he hastens to propitiate by gifts the gods and their priests. The gifts are of two sorts:—first he confirms the old grants; secondly he gives in addition three more villages. The phraseology is tautological and somewhat ambiguous. Dakhiṇadiga Daṇḍapáṭa is the name of a Division (No. 14 of Sarkár Kaṭak. Abul Fazl). It is not now in existence. The bisis Antarodha and Bánchás still exist as pergunnahs. Gopapura is presumably the present Gope, where a tháná has been located. The other two villages cannot be traced.

Left side.

No. III.

Length 2′ – 0 × 7″—Lines 8.

L. 1 वीर श्री प्रताप कपिलेश्वर देव माहाराजाङ्कर विजय राज्ये समस्त ४ अङ्क आही

2 धनु अमावै सौरिवारे श्री पुरुषोत्तम कटके परमेश्वरङ्क दर्शन समए महापात्र

3 ककाइ सान्तरा महापात्र जलसरसेन नरेन्द्र महापात्र गोपीनाथ मंग राज महापात्र

4 काशीविद्याधर महापात्र वेलश्वर प्रहराज महापात्र लखन पुरोहित पटनायक दामोदर महा

5 सेनापती थाइ परमेश्वरङ्क श्रीचरण अग्रते भोग परिछा पात्र अग्निसर्मा
मुद्रहस्तर गोच

6 रे वोइला मुदलि श्री पुरुषोत्तमदेवङ्क देउलद्वारे लेखन करिवा आम्भर
ओड़ीसा रा

7 ज्यर लोण कउड़ी मुलकर न्याय्य छाड़िलि छाड़िलि छाड़िलि एहा राजा
होइ जे लङ्घइ से श्री

8 जगन्नाथ देवङ्कु द्रोह करइ।

Translation.

On Sunday the new moon in Dhanu of the 4th anka of the victorious reign of the warrior, the powerful Kapileśvara Deva Mahárája, at camp Purushottama while paying respects to the god, in presence of Mahápátra Kakái Sántará, Mahápátra Jalasara Sena Narendra, Mahápátra Gopínátha Mangarája, Mahápátra Káśi Vidyádhara, Mahápátra Belaśvara Praharája, Mahápátra Lakhan Purohita, Paṭanaik Dámodara the generalissimo, before the feet of the God, and in the *cognisance* of Pátra Agni Sarmá, the examiner of Bhogas and the seal-bearer, spoke (the king) :—Engraver, write on the door of the temple of the God Purushottama—the tax levied on salt and cowries I remit, remit, remit. Whoever being king, violates this, rebels against Lord Jagannátha.

Note.

This is the earliest inscription of the series. According to the Madalá Pánji, Kapileśvara Deva was an usurper, who from a minister became the king. He remits the taxes on salt and shells, apparently to popularise his reign. Of the eight officers named, Káśi Vidyádhara and Jalasara Sena Narendra are mentioned in the Mádalá Pánji to have been associates of the king in his youth.

Left side.

No. IV.

2 parts.

Part 1 – 4′ – 4″ × 11″—Lines 9.

L. 1 श्री वीर प्रताप कपिलेसर नवकोटी कर्णाटकलवरगेश्वर गजपति गौड़ेश्वर
देव महाराजाङ्क विजे राइजे समस्त ४१ आङ्के

2 धनु सुकल सप्तमि रवीवारे श्री पुरुषोत्म जगन्नाथ देवङ्क पद्मपादकु
भक्ती निमित्ये कपिलेश्वर रजाए सेवा करिदिले रल

3 तोढ़रमान श्री भूजर रत्नशंख चक्र दुइ प्रमेश्वरङ्क मनहिंकि सुनायोगाड़ एमान आनि प्रवेस कले हासिक माहा

4 पात्र जमसर माहापात्र विश्वेश्वर माहापात्र करमु माहापात्र नाथ माहापात्र एते लोके प्रवेश कले नन्दि माहापात्रङ्क अधिकारे

5 माजणामण्डपे चउदशतप्रकरण भोगरागर समस्तन्ती थोइ देली। प्रमाणे लागि कराइले रत्नमकुट ८ कणफुल जोड़ातुंग

6 ल ४ नोड़का निसव्वा करि योड़ा ८४ हीरामाणिक विचित्रमाल २ नाना नाएक मुदि १२ मुकुता

7 याउलि ८ मुकुता वड़कण्ठमाल ४ माणिकसुता मा ८ मरकत जाउलि ८ मरकत मुकुता मा ५ नानारत्नकपदक ४ मरल्क

8 तिसरसरे मानिकसुआ पदसरि ४ मुकुता तोसरा उतुरी २ एका रत्नहारे १ मुकुता तोढ़र २

9 पादपलव २ नाना नाएक वाऊटी जोड़ा १२ हिरामानिकि वला जो २ जालितोढ़र २

Part 2 – 1′ – 9″ × 7″—Lines 6.

L. 1 नाना परताड़ योड़ा १ पाऊड़ ४ मुकुता कञ्चनपट ६
2 कान्तियरकवर + कटी मेखला कनकझलाइ माल ५
3 सुना योगित्र १ नाना पदार्थं शंख चक्रर रत्न मा
4 ढ़ १६२ सुना + + + गोटिए श्रीकपिलेश्वर र
5 जाए एहा जगनाथ महाप्रभुकु दिलि एहा नेमा वो
6 लि ये मनरे धरइ से श्री जगनाथङ्कु द्रोहकरइ।

Translation.

On Sunday, the 7th (tithi) of Dhanu bright half in the 41st (anka) of the victorious reign of the warrior, the powerful, the elephant-lord, the king over Gauḍa and ninety millions of Karṇáṭa and Kalabaraga, Kapileśvara Deva Mahárája, out of devotion to the lotus-feet of the Lord Jagannátha of Purushottama, Kapileśvara Deva Rája gave for sacred use :—Ornamented wrist-ornaments (toḍhar), and decorated conch and shells, two for the Lord's arms. For the bhoga of the god, the following (men) brought a supply of gold, *viz.*, Hásika Mahápátra, Jamasara Mahápátra, Viśveśvara Mahápátra, Karamú Mahápátra and Nátha Mahápátra, these (men) supplied, under the superintendence of Nandi Mahápátra; all (the articles) were placed in the audience hall for bhogas of 1400 sorts. In accordance with directions (of the S'ástras, the following) were put on the body (of the Lord), *viz.*, one ornamented crown, earrings 8, Tungal in pairs 4, small earrings counted at 14 pairs, necklaces set with diamonds and rubies 2, rings set with various sorts of stones 12, pearl ear-ornaments (jáulis) 8, large necklaces of pearls 4, necklaces of rubies 8, emerald ear-ornaments (jáulis) 8, necklaces of emeralds and pearls 5, lockets set with various sorts of stones 4, three-rowed emerald neck-ornaments with pendant ruby parrot 4, three-rowed pearl breast-ornaments (uturis) 2, ornamented necklace 1, pearled wrist-ornaments (toḍhor) 2, golden feet set with stones (páda-pallabas) 2, bangles set with various sorts of stones 12 pairs, balás or wrist-ornaments of rubies and diamonds 2 pairs, netted tordhars 2, bracelets or partárdhas one pair, feet-ornaments or páhuráhs 4, pearl bracelets 6, waistlets with golden drops (?) 5, gold Jogibra (?) 1, the gold of (these) various things, and of the conch and shell is 192 márdas, one (illegible); the king Kapileśvara made a gift of these to Lord Jagannátha. He who intends to take them, rebels against Jagannátha.

Note.

The inscription gives an interesting enumeration of the various ornaments bestowed by Kapileśvara Deva on Jagannátha. Many of these ornaments are still in use.

Left side.

No. V.

2′–8″ × 9″—Lines 6.

L. 1 वीरश्री गजपति गउड़ेसर प्रताप कपिलेसर देव माहाराजाङ्कर विजे राज्ये
2 समस्त ३५ आङ्को मेस कृ ४ वुधवारे भो जगनाथ तोह्र सेवक ए
3 मतं जनाउआछि रादइजनांकर साआन्तमानङ्क। मुँइ पाइक राउतकु करि
4 + + + + + वालकालु पोसि आनिलि एमाने मोते सबुरें छाड़िले
5 एमानङ्कु मुइ ये याहा अनुरूपे विहिवी नियोगिवि विभो जगनाथ
6 एकथा मोहर दोस अदोस विचार।

Translation.

On Wednesday the 4th (tithi) of Mesha dark half in the 35th (anka) of the victorious reign of the warrior, the elephant lord, the king over Gauḍa, the powerful Kapileśvara Deva Mahárája:—Oh Jagannátha, thy servant thus informeth the high officers in the kingdom. From soldiers and servants (illegible, probably "up to them"), I looked after (all) from boyhood, now they kave forsaken me. I will treat them as they deserve. Lord Jagannátha, judge the correctness or incorrectness of mine (acts).

Note.

According to Mádalá Pánji, in the 35th anka of Kapileśvara Deva's reign, the Zemindars of Kundajori broke out into rebellion. From the context they appear to have been assisted by many of the king's own officers.

Left side.

No. VI.

3′–3″×1′–3″—Lines 10.

वीर श्री गजपति गउड़ेश्वर नवकोटीकर्णाट कलवरगेसर विरवर श्री प्रतापरुद्र देव

माहाराजाङ्कर समस्त ४ अङ्क आहो ककड़ा सु १० वुधवारे अवधारीत आइँगा प्रमाणे वड़

ठाकुरङ्क गीतगोविन्दठाकुर भोगवेले ए नाट होइव । संभाधुप सरिला ठारू

वड़ सिंगार परियन्ते ए नाट होइव । वड़ ठाकुरङ्क संपरदा कपिलेश्वर ठाकुरङ्क वन्धा

नाचणीमान पुरुणा संपरदा तेलंगी संपरदा एमाने सविहें वड़ ठाकुरङ्क गीतगो

विन्द ऊँ आनगीत न सिखीवे । आनगीत न गाइवे । आन नाट होइ परमेश्वरङ्क छामुरे न

हव ए नाट वितरके वइणाम गाअणा चारीजन अछन्ति एमाने गीतगोविन्द गीतहि से गाइवे

एहाङ्क ठारू अभिच्छितमाने एकस्वररे शुणी गीतगोविन्द गीतहिँ से शिखीवे आनगीत न शिखीवे एहा

जे परीछा आनगीत नाट कराइले जानी से जगन्नाथङ्क द्रोह करइ ।

Translation.

On Wednesday the 10th (tithi) of Kakaḍá, bright half in the 9th anka of the warrior, the elephant-lord, the king over Gauḍa and ninety millions of Karṇáṭa and Kalabaraga, the mighty Pratáparudra Deva

Máhárája according to the ascertained orders:—Dancing will be performed thus at the Bhoga time of the elder Ṭhákur (*i. e.* Balaráma) and Gítagovinda Thákur (*i. e.* Jagannátha). This dancing will be held from the end of evening dhúpa up to the time of Baṛasingár (bed time) dhúpa. The batch (of dancing girls) of Baṛa Ṭhákur, the fixed female dancers of Kapileśvara Ṭhákur, the old batch, the Telangá batch, all will learn no other song than Gítagovinda of Baṛa Ṭhákur. They will not sing any other song. No other kind of dancing should be performed before the god. Besides the dancing, there are four Vaishṇava singers; they will sing only the Gítagovinda. Hearing in one tone from them, those who are ignorant will learn the Gítagovinda song; they should not learn any other song. That superintendent who knowingly allows other songs to be sung, and other dancings to be performed, rebels against Jagannátha.

Note.

This edict directs what songs are to be sung and what dances are to be performed at the time of night bhogas (from evening to bed-time). The songs will be the songs of Gítagovinda and nothing else. The dancers were in four batches, and they were taught by four Vaishṇava singers.

Left side.

No. VII.

वीर श्री गजपति गौड़ेश्वर नवकोटि कर्णाटकलवरगेश्वर प्रताप
श्रीरुद्रदेव महाराजाङ्क समस्त
५ अङ्क आहि धनु तिनदिन (?) सोमवारे + + + कटक विजेसमए

(Rest illegible).

Translation.

On Monday, the 3rd (?) of Dhanu in the 5th anka of the warrior the elephant-lord, the king over Gauḍa and the ninety millions of Karṇáṭa and Kalabaraga, the powerful Rudra Deva Maháraja, at camp. . . .

Note.

This inscription is the lowermost. Ordinarily the place is dark, and the pilgrims while passing through the door, feel the way by touching the wall. In this manner almost all its lower part has been rubbed off.

Right side.

No. I.

in three parts.

Main part:—2′ 9″ × 9″—Lines 5.

वीरश्री गजपति गौड़ेश्वर नवकोटीकर्णाटकलवरगेश्वर
प्रताप पुरुषोत्तम देव माहाराजाङ्कर समस्त २ आङ्को मेस
सुकल १२ गुरुवारे श्री पुरुषोत्तम कटके विजे समए
दन्तरत्नपलङ्क १ रत्नकलसध्वजसिंहासने १ रत्नछति १
रत्नखट १ सुनामार्थ्यंणीपट १ रत्नवेण्टचँवर २ ।

Western part:—Lines 7
6½″ × 11″

पुरुषोत्तम माहाराजाङ्कर दत्तर
त्नपलङ्क २
रत्नकानफुल
४ मेरुगर्भे
वाऊटि योड़ा २
रत्नविञ्चना १
चन्दिआगो १

Eastern part:—Lines 5
1′ 0 × 10″

रत्नदर्पंण गोटिए
१ एहानेमा
रे ये मनरे धरइ
से जगनाथ देवङ्क
द्रोह करइ ।

Translation.

On Thursday, the 12th of Mesha, bright half in the 2nd (anka) of the warrior, the elephant-lord, the king over Gauḍa and ninety millions of Karṇáṭa and Kalabaraga, the powerful Purushottama Deva Mahárájá, while encamping at camp Purushottama:—Ornamented ivory couch 1, ornamented throne with flags and jars 1, ornamented umbrella 1, ornamented bedstead 1, golden-handled broom 1, ornamented-handled chauris 2.

Eastern part.

Gift of king Purushottama:—
Ornamented couches 2,
Ornamented earrings 4,
Merugarbha wristlets 2 pairs,
Ornamented fan 1,
Chandia (hair-ornament like moon) 1.

Western part.

Ornamented mirror 1. He who thinks of taking these, rebels against Lord Jagannátha.

Note.

This inscription seems to be a continuation of No. II left side, and is of the same date.

Right side.

No. II.

2′ 5″ × 1′ 2″—Lines 8.

वीर श्री गजपति गउड़ेश्वर प्रतापकपिलेश्वर देव
माहाराजाङ्कर विजेराज्ये समस्त १९ ङ्क आह्णीमेस अमा
वै रवीवारे मलिकापरिसादिग विजेकरि बाऊड़ा कटकाइ
श्री पुरुषोत्तमकटके वीरमोनोइ विजे समए श्रीचरण
अग्रते कोठघर सान्तरा परिच्छमहापात्र रघुदेश्वो नरिन्द्र
जनाइँ काड़कराइलाकु आइंगां होइला श्री पुरुषोत्तमर
पुण्डरिक्ष गोपसाढ़ी देलि एथकु ये अवालघंइ से जग
नाथ देवङ्कु द्रोह करइ ए मुदले केलाइ खुण्टिया लिहाइला ।

Translation.

On Sunday the new moon in the Mesha of the 19th anka of the victorious reign of the warrior, the elephant-lord, the king of Gauḍa, Kapileśvara Deva Mahárája, having conquered the side of Malliká Parisá, on the journey back, at camp Purushottama, while taking his food, the storekeeper and superintendent Raghu Deva Narendra having made known (to the king) it was ordered :—I give to god Purushottam the Sári cloth known as Puṇḍariksha gopa. Whoever violates this rebels against Jagannátha. This writing Kelai Khuṇṭiá inscribed.

Note.

The Mádalá Panji mentions the conquest of a Malliká country in the 21st anka—21st may be a mistake for 19. "Puṇḍariksha gopa" may be the name of a village.

Right side.

No. III.

4′ 1″ × 1′ 4″—Lines 7.

वीर श्री गजति गउड़ेश्वर नवकोटीकर्णाट कलवरगेश्वर प्रताप
कपिलेश्वर
देव माहाराजाङ्कर विजेराज्ये समस्त २१ अङ्क आही ककड़ा सु १२
रवारे श्री पुरु

षोत्तम कटके दखीनघरे मानग्रामण्डपे विजे स्वए अवधारीत आज्ञां
वोइला मुदले भो श्रीजगनाथ मोहर वाहिज अभ्यन्तर समस्तत तु जानु
मोहर येते रतन पदार्थं अछि से तोहर एहा उ आवर आन धन
जिस अछि मुँइ ब्राह्मण हाथरे ताहा येते देइ पारइ ताहा देवि
ए भूमिखण्ड तु याहाकु अनुग्रह कर मोहर से वेप + वे ।

Translation.

On Thursday, the 12th of Kakrá, bright half of the 31st anka of the victorious reign of the warrior elephant-lord, the king over Gauḍa and ninety millions of Karṇáṭa and Kalabaraga at Camp Purushottama, while holding court in the audience-hall of the southern block (of rooms), it was ordered to be inscribed;—Oh Jagannátha, thou knowest everything of mine both external and internal. Whatever precious things I have, I will bestow on the Bráhmans as much as I can. He, on whom thou pleasest to bestow this land, is my (illegible.)

Note.

Herein the king humbles himself before Jagannátha and promises to make liberal gifts to Bráhmans. The inscription appears to be the outcome of some heavy troubles or impending disasters. The usual curse at the end is wanting.

Right side.

No. IV.

4′ 10″ × 10″—Lines 7.

L. 1 वीरश्री गजपति गउड़ेश्वर नवकोटीकर्णाट कलवरगेश्वर प्रताप श्री
गजपति पुरुषोत्तमदेव माहाराजाङ्कर

2 विजयराज्ये समस्त १९ अङ्क श्राही सिंह शुक्ल ८ गुरुवारे वाराणसि
कटके श्रीनअर गोपालप्रिय जगतीर दक्षिणमेढ़रे वड़ अवकाशे

3 समस्त वेहोरा माहापात्र माहापात्र पात्रसनि मिश्र खटन्ति वुड़ा
लेङ्का समस्तङ्क मुक्ताविलारे आइगां होइला आम्भे अनुवव करि शुनी
देखी ए पृथिवी येतेकाल

4 थाइ तेतेकाल ए ओड़ीयाराज्यर राजामानङ्कु तिआरि अकु सवु
राजामाने ब्राह्मणङ्कु दान देवा शान्तिपुर्व्वक मनजोग करि धनस्त्री
प्राण राज्य एहि चारि कथार केवेहें

5 ब्राह्मणङ्कु नियोग न करिव। एहि चारि कर्म्मरे निजोजिले ब्राह्मण

जाग कर्म्मैहि से करइ छ (?) खन करइ मुँ (?) ग्रतधा + + +
नेकति आराज्य जात + धि मानङ्कु आदेश
6 वचन लङ्घन करि ये अवा आन करइ से जगन्नाथ कु द्रोह करइ । से
महापातक । अति पातक वि + को समस्त पातक कलार फल पाइ
7 सवुँहे एकथा दृढ़करि मनरे धरी आम्भर उपदेश कर ! कर ! कर !

Translation.

On Thursday the 8th of the Siṃha, bright half in the 19th anka of the victorious reign of the warrior the elephant-lord, the king over Gauḍa and the ninety millions of Karṇáṭa and Kalabarga, the powerful Purushottama Deva Mahárája, at camp Báráṇasi (Kaṭak) while holding his great leisure in the southern portion of the royal residence named Gopála-priya, Behorá Máhápátra, Máhápátra Pátra-s (m. ?)-aṇi Miśra, and the old Lenká being present it was ordered :—Feeling, hearing and seeing, I advise the kings of Orissa as long as this world lasts, all ye kings, ye are to make gifts to the Bráhmans with peaceful and attentive mind. Never deprive Bráhmans of these four matters—wealth, wife, life and land. These four things not being deprived, the Bráhmans will perform the Jágas, will not deceive (?) (illegible). Whoever, violating these advices and sayings, does otherwise, rebels against Jagannátha. He is a first class sinner (?), a great sin (illegible) gets the effect of all the sins. Let all, bearing in mind this fact, according to my edicts do! do! do!

Note.

The inscription is long and partly illegible. Some of the letters have been swallowed up by a crack in the stone; others have been effaced by the constant rubbing of pilgrims' hands. Báráṇasi is the old name of Kaṭak and still survives in Birdánási, the westernmost part of Kaṭak along the Kátjori river. Lenká is an officer whose duties are not known.

Right side.

No. V.

5′ × 2′ 3″—Lines 18.

L. 1 श्री वीर गजपति गउड़ेश्वर नवकोटो कर्णाट कलवरगेश्वर श्रीम (हा)
राजाधिराज मान गोविन्द श्री
2 गोविन्द देव राजा श्रीश्रीमदिरवर प्रताप श्रीश्री प्रताप देव
महाराजाङ्कर विजे राज्ये समस्त

3 ४ अङ्क आछि विछा सुकल ढतिया मङ्गलवारे जगमोहन मण्डपे श्रीजगन्नाथ छामुरे ज

4 णाइले भो जगन्नाथ तोहपद्मपाद देखी आसिवा यीवारे विना सवुटि नर्कं विभ्नं उदयगीरि स

5 रि परिजन्ते स्वदेशी परदेशी जात्रीमाणङ्कर दाण प्रति × × × ×

6 गड़जातर राजामाने × ×

7 पालना करिवे जे एकथा अन्यथा क

8 रइ से श्रीजगन्नाथकु द्रोह करइ

9 स्वहस्ते ब्राह्मण वध कला पाप

10 नत्वा द्राविनो भूमिपाल

11 दते रामचन्द्र

12 प्राप्या काले

13 पालना

Rest illegible by plastering

Translation.

On Tuesday the 3rd of Bichhá bright half of the 4th anka of the victorious reign of the warrior the elephant-lord, the king over Gauḍa and the ninety millions of Karṇáṭa and Kalabaraga, king of kings, the powerful Mánagovinda Govinda Deva Rájá, Pratápa Deva Mahárájá, in the porch and before Lord Jagannátha he thus made known (his prayer) :—Oh Jagannátha, without going and coming to see your lotus feet all appear as hell. The gifts of pilgrims (of places) up to Vindhyá and Udayagiri mountains, whether native or foreigner (rest illegible). The kings of Garját (illegible) will obey. He who violates this order rebels against Jagannátha, and gets the sin of killing a Bráhman with one's own hands.

(Here follow four stanzas of Sanskrit slokas).

Note.

From the date, and the name, Mána Govinda Govinda Deva appears to be the same as Govinda Bidyádhara of the Mádalá Pánji. He was a minister of Pratápa Rudra Deva, and became the prime minister during the short reigns of his two sons. Finally he murdered them and ascended the throne himself.

BHUVANESVARA TEMPLE.

Right side.

No. I.

2′ 4″ × 6″—Lines 6.

L. 1 विर श्री गजपति गउड़ेश्वर नवकोटी कर्णाट कलवरकेश्वर प्रताप पुरुषोत्तम देव
2 माहाराजङ्कर विजे राज्ये समस्त अ १९ ङ्क साहितुल कृ२ रइवारे कृतिवासक
3 टके पुजा अवकाशे आग्यां होइलाए ये विसि वेहारा चन्द्रवाण ये
4 जाक करेइ सेहि ताहाकु न लागइ एतेतारि ये तारकर्त्ता निजर प्रति भूवने
5 श्व देवङ्कु ताहाइ ये राज द्रोहा आइग्यां होइला विसि वेहारा लिहाइला
6 सर्व्वे

Translation.

On Sunday the 2nd of Tula, dark half in the 19th anka of the victorious reign of the warrior the elephant-lord, the king over Gauḍa and ninety millions of Karṇáṭa and Kalabaraka, the powerful Purushottama Deva Maháràja at camp Kṛitibás during the pújá leasure, it was ordered:—He who throws magical arrows unto Bisi Behárá will not succeed. In spite of this (order), he who does so, is cursed by (the oath of) god Bhuvaneṣvara, he is a rebel. By order of Bisi Behárá inscribed. All (hear).

Right side.

No. II.

2′ 3½″ × 5″—Lines 6.

L. 1 श्रीविर कपिलेसर देव महाराजाङ्कर विजेराज्ये समस्त ४ अङ्क आही
2 मिथुन संक्रान्ति कृष्ण ६ मङ्गलवार कृतिवास कटके भितर पुजा अवकासे
3 हाए गुरु वास माहापात्र भुवनेसर माहापात्र एदुइ हे आसि लिहाइलेए
4 दुइसर गोचरो आग्यां वोलि होइला आम्भर ओड़िसा राज्ये जेते राजा
5 मूल सवुहें राजाङ्कु हिते ब्रति ये आपना सदाचारे थिवे असद्मार्गे
6 नरहिवें राजाङ्क अयाहिते ब्रतिले रजावाहार करि ताहार सर्वस हरि।

Translation.

On Monday the 9th of the Mithúna, dark half Sankránti in the 4th anka of the victorious reign of the warrior Kapileśvara Deva Mahárája, at camp Kṛitibás during the inner pújá leisure, it was ordered in the presence of Raiguru Básu Máhápátra and Bhuvaneśvara Máhápátra who caused (this) to be inscribed :—All the kings in my Orissa kingdom should work for the good of the (paramount) sovereign, should keep virtuous ways, should not remain in bad ways. If they act badly towards the sovereign, they will be expelled from the kingdom and all their property confiscated.

Note.

These two inscriptions are on the right jamb of the doorway leading to the porch of the Bara Deúl at Bhuvaneśvara. They are inscribed just in the centre at a man's height. No corresponding inscriptions are to be found on the left jamb.

The general remarks made in the Jagannátha inscriptions apply, *mutatis mutandis*, to these also. The dates do not seem correct. The tithis of the years in question do not fall on the week-days stated.

* * *

The Topography of Old Fort William.—By C. R. Wilson, M. A.

In the present paper I propose to lay before the Society the results of certain excavations made during the last four months of the year 1891 and the first four months of the year 1892, on the site of old Fort William, Calcutta.

These are not the first excavations which have been made at this spot. In 1883 Mr. R. R. Bayne, while erecting the East India Railway Offices in Fairlie Place, came across considerable portions of the old fort walls. He reported his discoveries to the Society in a paper which will be found in the Journal for 1883, Vol. LII, Part I, No. II.

The general position of the old fort with its adjacent warehouses is well-known. It stood on the ground now occupied by the General Post Office, the New Government Offices, the Custom House, and the East India Railway House. The warehouses built along the south side of the fort skirted Khoila Ghat Street. The north side was in Fairlie Place. The east front looked out on Clive Street and Dalhousie Square. Behind it was the river which then flowed further east than at present.

The old Fort.

The fort was in shape an irregular tetragon. Its walls were built of small thin bricks strongly cemented together. According to Orme, "its sides, to the east and west extended 210 yards, the southern side 130, and the northern side 100. It had four bastions mounting each ten guns. The curtains were four feet thick, and like the factory of Cossimbazar, terraces, which were the roofs of chambers, formed the top of the ramparts; and windows belonging to these chambers were in several places opened in the curtains. The gateway on the eastern side projected, and mounted five guns, three in front and one on each flank towards the bastions. Under the western face, and on the brink of the river, was a line of heavy cannon mounted in embrasures of solid masonry; and this work was joined to the two western bastions by two slender walls, in each of which was a gate of pallisadoes. In the year 1747, warehouses had been built contiguous to the southern curtain, and, projecting on the outside, between the two bastions, rendered them useless to one another. However the terraces of these warehouses were strong enough to bear the firing of three pounders which were mounted in barbett over a slight parapet." There were also blocks of central buildings within the fort. It had two gates on the river side besides that on the east front.

Mr. Bayne's discoveries.

When in 1883 Mr. R. R. Bayne began to dig at the corner of Fairlie Place for the purpose of laying down the foundations of the East India Railway House, he almost immediately came across remains of old walls built of small thin bricks such as have long ceased to be used. These were the walls of the old fort. Mr. Bayne followed up the indications thus found, and in the end was able to put together an almost complete ground plan of the north end of the fort. As a detailed description of these discoveries has been already placed before the Society, it will be quite unnecessary for me to attempt to give any further account of them here. Nor do I wish at present to offer any criticisms upon the suggestions and theories which naturally occurred to Mr. Bayne in connection with his discoveries. I shall at once proceed to set forth the results which have been obtained since 1883 by a persistent search of the records and by recent excavations made on the spot.

Mr. Munro's discovery.

The first great step towards completing the work so well begun by Mr. R. R. Bayne was taken by Mr. T. R. Munro, who discovered in the British Museum a copy of a large map of old Calcutta on the scale of 100 ft. = 1 in., dated 1753. The map, it appears, was drawn by a Lieutenant Wells of the Company's Artillery, and was designed to show a projected new fort, but it also shows the old fort in great detail. A photograph of this plan was presented to the Asiatic Society in 1889 by Mr. Munro, and it is with this photograph in my hands that I have been able to carry out extensive excavations of the site of the old fort in the years 1891 and 1892 and thus complete the work of defining the topography of the place. The plan, it is true, is not quite accurate, but it is infinitely superior to the little rough sketch of the fort found in Orme's history, which was all Mr. Bayne had to go upon.

The Records.

The plan suggested a further searching of the records, both here and at home, to see if they could cast any further light either upon the plan itself, or on the projected new fort of 1753, or on the state of the old fort generally. Through the kindness of Mr. Forrest, I was enabled to see such records bearing on the subject as are now preserved in the Imperial Library at Calcutta, but I found that they were very meagre. Dr. Busteed, however, most generously devoted a considerable amount of his valuable time to looking up the records at home, and has furnished me with a complete list of all the passages to be found in the extant records which have any bearing whatever on the old fort, and on the question of improving it, or superseding it, which seems to have been so often discussed during the four or five years which preceded the tragedy of the Black Hole. These extracts are provokingly incomplete. They refer to fuller documents, but these fuller documents are not now forthcoming, having been all destroyed. Four plans are mentioned, *viz.*, Colonel Scott's, Captain Jones's, Simson's and Plaisted's, but none of these could be found by Dr. Busteed at the India Office. It is only by some lucky chance that a duplicate copy of Scott's, or Wells's plan found its way into the King's library at the British Museum. As, however, these extracts bring before us very vividly the circumstances under which the plan was drawn up in 1753, I will here give them in full, together with Dr. Busteed's valuable comments on them, before proceeding to speak of the plan itself.

Extracts. Scott and Wells.

1. From President and Council, Bengal, to the Court of Directors, the 28th February, 1754.

Colonel Scott having laid a project before the Board for securing this settlement against any attack from a country force which, in the present juncture, ought to be guarded against, and as we imagine the expense of it will not be very considerable, we have complied with his proposal and directed him to set about it as soon as possible. A copy of that project we transmit yr. Honours in this packet as we did not chuse for the sake of secresy to enter it after the consultations.

2. From President and Council, Bengal, to the Court of Directors, the 7th September 1754.

When Col. Scott proceeded to the coast he requested we would permit Lt. Wells to carry on the works he had planned at Perrin's in his absence which we accordingly complied with. * * * *. Col. Scott in consequence of Mr. Saunders and Council's[1] request for relieving Major Lawrence in the Field, left us on the 18th March, but it is with concern we informed yr. Hons. he died at Madras on 12th May of a violent fever.

3. From the Bengal Government to Wm. Watts at Moorshedabad, the 22nd August 1755.

It has hitherto been very unfortunate to this Settlement that every gentleman, who has had capacity or been appointed by our employers to fortify this place, have not lived even to make a beginning on the plans proposed,[2] *we have therefore agreed to wait our Masters' last commands by this year's shipping*, when if they are absolute and the situation of affairs in Europe portends war we must employ those who have the most experience and knowledge to execute plans of fortification, and this we shall put in practice without showing any diffidence to the right we have of securing our Settlement.[3]

4. A letter, signed by Messrs. Drake and Manningham, to the Court of Directors, the 3rd September 1755.

The death of Col. Scott put a check to our pursuing his plan for securing this settlement from any attack of the country forces with much alacrity *as we were cautious of laying out much money until yr. Honours signified yr. approbation of that work* which shall now be set about in as expeditious a manner as the season of the year will permit our carrying it into execution. Here we must remark that the Government[4] has not attempted to frustrate that design though it has a formidable appearance.

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[1] The Council of Madras. H. E. B.

[2] See *Long's Selections* No. 166.

[3] Perhaps it would have been wiser if they had shown some "diffidence" now after having for so long neglected their defences, even in the face of repeated orders from home. The new Nawáb in the following year opened their eyes on this subject. However, to give the Fort William Government their due, they had consulted Watts, the chief at Cossimbazar, as to the prudence of seeking permission from the Murshidábád Government before they took their defences in hand. They were prepared to conciliate the Nawáb and to resort to the customary bribery to him and his ministers. Watts opposed the idea, chiefly because the Nawáb was really so rich that no bribe which Calcutta could afford would be likely to convert him if unfavorably inclined; he urged moreover that the precedent of asking and paying for such permission might prove a very embarrassing one in the future, and that if the Nawáb should refuse, the English would be worse off than ever. On the whole Watts advised them to go on with the fortifications and say nothing, and, if in the meantime exception should be taken by the Murshidábád Court, Watts was not without confidence that he could prevail upon the Minister "Huckambeg," for a consideration, to divert the possible anger of the Nawáb. Events did not justify this confidence. H. E. B.

5. From President and Council, Bengal, to the Court of Directors, the 11th September 1755.

We shall pay due regard to yr. orders in regard to the fortifications Col. Scott projected for the defense of the place against a country enemy which are carrying on agreeable to his instructions, but not yet near finished. Mr. Wells who was recommended by the Colonel to overlook those works being dead, we have directed Mr. Barthw. Plaisted to see them executed: for what may relate further to those works or any others that may be found necessary for the defense of the settlement we beg leave to refer yr. Hons. to the gentlemen you have entrusted on that head.[5]

6. From President and Council, Bengal, to the Court of Directors, the 8th December 1755.

Mr. Wm. Wells, 2nd Lieut. of the Train under whose inspection the works at Perrin's were carrying on, departed this life on 8th August. In his room Mr. B. Plaisted took charge of those works jointly with Mr. O'Hara. They have our directions to execute the plan Colonel Scott left behind him.

Captain Jones.

7. On August 4th, 1755, Captain Jasper Leigh Jones of the Artillery addresses a letter to the President and Council, Fort William, about the state of the defences of Calcutta.[6]

It is with pleasure I hear the Hon'ble Court of Directors have earnestly recommended unto you an inspection in general regarding the Buildings Military (*sic*) and Fortifications. * * * I think it is my duty to study anything for the good of the service. * * * [He enlarges on this duty theme and deprecates the circumstance that he is armed with so little authority to initiate or take up any measures for the defending of a place whose safe custody he considers himself responsible for in a great degree. He proposes to relieve his conscience by giving Government his opinion as to the condition of their so-called defences before he betakes himself to the Coast where he is next for duty. He then goes on to speak of Col. Scott's project.] In the method I perceive the plan in regard to the inward works may by the order of the Hon'ble Ct. of Ds. be put into execution, but as there is no positive order to go to work on that, it is necessary now we should think for the good of the place we are entrusted with as well as the property of our proprietors and our Hon'ble Masters who employ us. [As there is a probability of a French war in Europe, he counsels that provision for that contingency should be the chief object in view: he considers that there is little or nothing to fear from a 'country enemy' as 'their interest for our continuation will be sufficient']. Provided a general war which is what we have to expect, it is natural to expect the enemy will attack this place, and in order to do this send some ships of war into the river whose coming near the town must be carefully avoided. It is certain the Hon'ble Ct. of Ds. has been always of opinion that if ever Calcutta was attacked it must be by some means from the river, and they, like prudent, experienced and good Masters, have provided their servants in time with the best guns they could procure which by their nature are for defense and not for sale, lying on the warfe unmounted from their landing to this day.

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[4] The Government of Murshidábád. H. E. B.

[5] Probably Drake and Manningham, as those two only sign the letter to the Court of the 3rd September 1755. H. E. B.

[6] "Bengal Consultations," 1755-56.

How far we have regarded their hint I can't say, as we have neither a carriage to mount any of them on, or even a gun already mounted in the garrison fit for service, and am very sorry I must be obliged to confess we seem to look more like a ruined and deserted Moor's fort than any place in possession of Europeans, much less a principal Settlement [There is more to the same purpose; his main recommendation is to repair the 'Line Wall' on the river bank, the immediate construction of fascines there as a temporary measure, the providing of vessels to be used as fire ships, and the manning of the batteries proposed by the gentlemen of the Militia Corps with trained Artillerymen intermixed with them]. What guns could be mounted on the 2 bastions by the river side ought likewise to be kept in good order with their platform and embrazures repaired, as they would be of infinite use, being so much higher than the guns of the Line Warfe Wall.

8. Captain Jones returns to the subject again on 11th Sept. 1755.[7]

Having not met with the pleasure of yr. approval in regard to my last letter to which this plan is in some measure a reference, and that it may not be misconstrued by yr. Honors, I hope you will be kind enough to give me leave to send it home, in the packet, for fear it might be thought (without an explanation) I had some views of converting the designs of a more perfect hand—this I hope will show I had no sinister views of my own.[8]

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[7] "Bengal Consultations," 1755-56.

Plaisted.

9. It appears from the Consultations of 24th November 1755, that Mr. B. Plaisted also furnished to Mr. Frankland "a plan he had taken of the town of Calcutta."

Colin Simson.

10. On 25th February, 1756, a letter was addressed to Drake and Manningham[9] by Colin Simson who thus introduces his own plan.[10]

Since the time I have had the honor to be appointed Engineer I have had an opportunity to examine the plan projected by Col. Scott for a fortification where Fort Wm. now stands, which appearing to be deficient in some of the things principally requisite in a fortification, I thought it my duty to represent the same to yr. Hons. that if you think proper the representation with the accompanying plan may be transmitted to the Ct. of Ds.

[He proceeds to criticise adversely Scott's plan in many particulars.] The whole Fort when finished will be a narrow slip on the side of the River, and in order to build it, the whole north side of the Factory which contains the apartments for most of the young gentlemen in the Company's service, the magazine for arms and military stores, shop for medicine, smith's shop, &c., must be pulled down immediately, as also the Church and Hospital; all these buildings are in constant use, they cannot be well spared, and it would be difficult to supply their place immediately.[11] [He repeats this drawback to Scott's plan in another part.] Before the building of the Colonel's plan can be carried on there must be pulled down immediately all the north side of the Factory, the Church, Hospital, godowns of Mr. McGuire's house, the Dockyard, and godowns of the Company's house. Whereas in order to go on with building the Square nothing need be pulled down but the outhouses of the Company's House and a small part of north-east corner of present Fort.

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[8] This plan was ordered "to be sent to the Honourable Company in the box of books per *Hardwick.*" As for Captain Jones, *R. Drake Junior* and his brethren did not like to be hustled by this plain-spoken and honest man; his gloomy forebodings—too soon to be realized, but from a quarter which even he did not foresee—were most unwelcome. Like the daughter of Priam he possessed the gift of prophecy which nobody believed, and accordingly he got nothing but rebukes for his pains. "On the 4th August Captain Jasper Jones sent in a letter to the Board with his sentiments on the present fortifications of the place, and what he thought necessary for its defense in case of war. The Board being of opinion it was irregular, improper and unnecessary, we ordered our Secretary to inform him that our orders had been issued to his Superior Officer to whom he should have applied if he had anything material to offer." Poor Jones did not go to the coast as he proposed: he died instead on the 22nd November 1755, having been overtaken with monotonous punctuality, by the "violent fever" which had already accounted for so many of those who dealt with the defences of the settlement. The Bengal recording angels said grandiloquently, in their letter to the Court of Directors, that he "demised," and this they announced without the hollow customary formality of any expression of regret. Captain Witherington reigned in his stead, and Lieutenant Grant became a Captain. H. E. B.

[9] The special Committee on fortifications presumably. H. E. B.

[10] Letters from Bengal 1756.

Simson's suggestion was 'to save most of these buildings and to erect a square fort (as by the accompanying plan) which runs from the north side of the present fort round the Church through the Tank towards the horse's Stables and thence down to the waterside between Mr. Amiott's house and that of the Company.'[12]

There is only one allusion to be found in Simson's letter to the Fort river-bastions. 'The gun wharf or low battery on the river side which is not flanked by any fire from the Fort is proposed to be left in its present situation, and as its wall projects forward from the angle of the north-western bastion towards the river, it prevents the face of that bastion from being flanked. Neither is the face of the south western bastion towards the river flanked, the line of its face running without side the opposite flank.'

Wells's plan of the fort.

I may now pass on to describe Wells's plan of the fort to which frequent allusion has been made in the foregoing extracts and of which I give a facsimile (Plate VI). The plan is preserved in the British Museum having found its way there from the King's library. It is endorsed "No. 11 Duplicate Plan of Fort William and part of Calcutta by Wm. Wells under Col. Scott drawn in 1753"; and again in another part.—"Received per Dunington, 10th October 1754." The object of the plan is to show the new fort which Col. Scott projected in 1753, but it incidentally shows the old fort in considerable detail, the scale being 100 ft. = 1 in. Looking at the plan we recognise at once the irregular tetragon with its four bastions, (α, β, γ, δ,) each having embrasures for ten guns. The north curtain here measures 210 ft., the south curtain 356 ft., the east 546, the west 560. The fort has three gates, ε the east gate, ζ the main south river gate, and η the smaller north river gate through which Suraj-ud-daula entered the fort. θ is the mound of the great flag-staff, ι is the passage joining the northern and southern divisions of the fort. $\kappa\lambda\mu\nu o\pi$ are the series of rooms south of the east gate, of which the southernmost should be the Black Hole. ξ is the staircase to the south-east bastion α. ρ is the verandah in front of the chambers $\kappa\lambda\mu\nu o\pi$. σ is the landing stage on which was placed the Company's crane. τ is the river wall armed with cannon and protected where necessary with palisades shown as dotted lines. Within the fort is a large central block of buildings marked in the plan as "The Factorey." Hamilton calls this the Governor's House, and I prefer to use this name to indicate it, as "the factorey" is more commonly used to denote the whole fort. At the same time it must be remembered that the Governor did not live here in 1753, but in the Company's House on the south side of the fort, although he still retained some rooms or offices in the south-east wing of the building for his own use. Adjoining the south-east bastion, we see the Export and Import Warehouses which, as Orme tells us, were added in 1747. Holwell speaks of them as the new, or colta, warehouses. The roofs was strong enough to carry cannon, and the south-east corner of the warehouses when thus armed seems to have been dignified with the title of the new S. E. bastion.[13] The east gate (ϵ) was also armed with five cannon. The warehouse yard is separated from another yard to the west of it by a small zigzag wall. This yard (ω) was, I conjecture, the carpenter's yard, since it is next to the warehouses, and is conveniently situated with reference to the river. As regards the buildings on the north side of the fort, mentioned in Simson's letter of 25th February, 1756, I conjecture that ϕ ϕ are the lodgings occupied by the young gentlemen in the Company's service, and that χ, the central building in the north division of the fort, is the armoury. The former conjecture is supported by the very nature of the ground plan of the buildings, the latter by the fact that when Mr. R. R. Bayne uncovered the foundations of χ in 1883 he found close by it pieces vitrified as if from a forge. The laboratory was situated in the east curtain[14] and must have been one of the rooms ψ ψ. Generally the

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[11] See *Long's Selections* No. 165. By an unfortunate misprint, "north side of the Factory" has been converted into "south side" in the *Selections*.

[12] Then the Company's Stables were beyond, *i. e.*, east of, the Hospital, and Amiott's house was just south of Douglas'. H. E. B.

[13] Holwell alludes to the new S. E. bastion several times in his long letter to the Court of Directors. In section 40 he says: "That [outpost] to the eastward at the Court House you will find commanded by the battery over the E. Gate and from the old and new South-east bastions within musket shot." And again: "The whole square between the south face of the fort and the hospital, and gate of the burrying ground was commanded not only by the New South-east bastion, but by seven 4-pounders on the new godowns." In section 48 he says: "Accordingly prepared with the flag [of truce] on the original S.-E. bastion where Captain Buchanan was then posted."

[14] I learn this fact from Dr. Busteed who has furnished me with the following

plan has every mark of care and accuracy, and, as regards the northern portion of the fort agrees fairly well with what Mr. Bayne discovered in 1883. There is only one suspicious circumstance to be noted here. The north and south alignment of the Governor's House is not parallel to the east curtain. This is *primâ facie* an improbable arrangement.

History of the recent excavations.

In the year 1891, all the buildings between the General Post Office and the Custom House were pulled down and the ground dug up for the purpose of laying the foundations of the new Government Offices, Dalhousie Square. As before in 1883, so now, the excavations revealed remains of the strangely fashioned walls of thin brick work which had once formed part of the old fort. In particular the curiosity of the public was much excited by the discovery of a small rectangular chamber faced with hard cement standing in the midst of four larger walls which looked down grimly on it.

At the beginning of September 1891, having made myself acquainted with the main features of the old fort, I went down to see the excavations. Almost the first thing I did was to measure the small rectangular chamber and the space between the larger walls which surrounded it. The small chamber measured east and west 9 ft. 9 in.; the distance between the thick walls east and west was 14 ft. 10 in. These measurements and the general appearance of the walls convinced me that the thick wall on the east was the curtain wall of the fort, that the wall on the west was the wall parallel to the curtain built for the purpose of containing the chambers running along that side of the fort, and that the smaller plastered chamber was a strong-room or godown.

I next identified the remains of the east gate. The walls had been much cut away by the excavations, but enough remained to show their true nature. Moreover, on measuring the distance from the spot where these walls stood to the record plate marking the north-east angle of the fort as determined by Mr. Bayne, I found that it agreed fairly well with the measurements given in the plan.

This discovery of the true position of the east gate was most important, because it settled finally one of the chief disputed points in the topography of the old fort, and it at once became the starting point for further investigations and discoveries. The value and significance of the excavations now became clear to me. If this was the east gate then the

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extract from a letter written by Holwell to Bombay, 17th July 1756, when just released from "Muradabad." "The 20th in the morning the enemy formed three assaults at once, against the N.-W. bastion, against the N.-W. Futtoch or barrier, and against the windows of the Laboratory on the eastern curtain, and attempted to scale the North-West window."

mutilated fragments of brick work I had just been touching and measuring were all that remained of the well-known court of guard, barracks and Black Hole, spoken of by Orme and Holwell. West of them was the parade ground where the soldiers of Suráj-ud-daula had been drawn up to keep guard over their captives, and west of this again I should find the foundations of the Governor's House in the Fort. On advancing westward to a distance of about 110 ft. from the east curtain, the walls of the south-east wing of the Governor's House were readily discovered; and after a certain amount of careful excavation its leading features were all ascertained. Meanwhile I was anxiously trying to fix the position of the south curtain wall and the three lines of arches shown in the plan running parallel to the south curtain. The tradition has always been that the old arcade in the yard of the General Post Office was part of the old fort, and although Mr. Bayne had argued that this could not be the case, I felt convinced that tradition was right. I was, however, for a long time baffled in my efforts to prove the truth of the tradition owing to the fact that the actual distances between the lines of the arches of the arcade and the corner of the north-east wing of the factory, which had been discovered, could not be made to agree with the distances shown in the plan between that corner and the lines of arches along the south curtain. It was only after a good deal of excavation that the true position of the south curtain was established, and it became evident that the south face of the old arcade is part of the first line of arches within the curtain, that the pillars in the centre of the arcade belong to the second line of arches, and the north side of the arcade is on the alignment of the third and innermost line of arches.

The settling of this difficulty necessarily led to a further set of investigations. If these were the real positions of the south curtain wall and of the lines of arches within it, it followed that the plan was inaccurate in its representation of this part of the fort. Hence doubts naturally arose as to whether the plan was correct when it represented the east curtain wall as inclined at an angle to the north and south alignment of the Governor's House. It could not but seem more likely that they were parallel. To determine this point, excavations were made in the yard of the Custom House, and by this means the main outlines of the north-east wing of the factory and also the north and south alignment of the main building were ascertained. Here too it turned out that the plan was incorrect.

From this point the work of excavation was comparatively easy. Further investigations cleared up all that was obscure about the south curtain wall, and fixed the position of the block of buildings running east and west dividing the fort into two sections.

The plan given in Pl. VII gives the combined results of the excavations made in 1883 and in 1891. It shows the existing buildings on the site and over them the old fort is drawn. The walls of the darkest tint are the walls discovered by me, those of a lighter tint are walls discovered by Mr. R. R. Bayne. The still lighter tint indicates walls whose position has not yet been verified. In indexing the plan for reference I have tried to follow a uniform system.

The Governor's House in the Fort.

I shall now describe the different portions of the fort which have been discovered in 1891, and I shall begin with "The Factorey" or "the Governor's House in the fort," which Hamilton describes is "the best and most regular piece of architecture that I ever saw in *India.*" I have dug up as much of the foundations of this "Piece of Architecture" as was possible without disturbing the existing buildings. I think it merits Hamilton's praise. The walls were undoubtedly strong and well-built, the shape of the building is regular and suggests the quadrangle of a college. The main building (*OPQWVT*) faced the river. Its length north and south was 245 ft.[15] In the centre of this face was the great gate of the Governor's House, and from it a colonade ran down to the south water gate of the fort and the principal landing stage. This was the way by which Governor Drake escaped to the ships in 1756. Entering this gate and turning to your left you ascended the great flight of stairs which led, I conjecture, to the hall and the principal rooms. At right angles to the main building, and at each end of it, were wings running back towards the east curtain. Thus these north-east and south-east wings, together with the main building formed three sides of a rectangle having a raised cloister or piazza running all along the three sides. In the centre, I imagine, was a green grass plat. The south-east wing contained the apartments of the governor, and the factors probably had rooms in different parts of the building. Almost the whole of the ground on which the main building stood is at present occupied with government godowns. A trench was, however, dug from east to west in the passage between the opium godowns and the import godowns, and this enabled me to determine the positions of the principal walls, which were uncovered at the places marked p p_1 p_2. The wall p p_1 is one of the cross walls of the Governor's House forming the north side of the grand staircase. It is three feet thick. At p it meets the west wall of the Governor's House which is 3 ft. 9 in. thick, at p_1 it meets the east wall of the principal building (*PV*) which is 4 ft. 6 in. thick. The internal distance between these two walls is 30 ft. 9 in. At p' the cross wall p p_1

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[15] There are at least two or three views given in old prints of the west face of this building.

meets on its south side an inner wall 3 ft. thick, parallel to the main west wall of the building, and at p'_1, it meets a similar wall 3 ft. 9 in. thick. The internal distance between the main west wall and the inner parallel wall at p' is 10 ft. 3 in.; the internal distance between the inner wall at p' and the next one at p'_1 is only 6 ft. 9 in. These inner walls doubtless served to support the grand staircase. The inner wall at p'_1 intersects the cross wall pp_1 and continues on the north side of it. I do not know the reason of this. The wall $O_2p_2R_2$ is the wall which supported the columns of the cloister, or verandah, which ran round the inside of the quadrangle of the Governor's House. It has been uncovered from p_2 to R_2 where it turns to run along the inside of the north-east wing. The wall $O_2p_2R_2$ is 2 ft. 6 in. thick, with an offset of 6 in. at the points where it actually supported the pillars of the cloister. The distance between the pillars of the west cloister, from centre to centre, was 10 ft. 6 in. At p_3, 4 ft. 6 in. from p_2, I found a piece of a small wall 1 ft. 6 in. thick. This wall contained the raised terrace on which the cloister stood. There is also at p_2 a wall $p_2\,p'_2$ which bonds with the wall $R_2p_2O_2$, and which runs back towards, but does not meet, the east wall of the main building PV. The purpose served by this wall $p_2\,p'_2$ is not clear.

Excavations were also made to find the north-west corner of the factory (W), and the north-east wing (SRR_2S_2). The north-west corner (W) was readily found. The walls here are 3 ft. 6 in. thick. From W the north wall of the factory continues in a straight line for a distance of 50 ft. 3 in., outside measurement, to V. Here it is set back 3 ft. 6 in. From this point (U) the wall again runs on in a straight line for a distance of 18 ft. to T, where it is set back 4 ft. 9 in. ($TR=4$ ft. 9 in.), and thence continues as the north wall of the north-east wing (RSS_2R_2). The wall $WVURS$ is throughout 3 ft. 6 in. thick V, the point where this wall is first set back, is the north-east corner of the main building, where the wall WV meets the wall VP. The second set-back occurs at the point where the wall UT meets the wall TRR_1, which runs parallel to VP and forms the east wall of the staircase on this side of the building. The wall TRR is 3 ft. 6 in. thick and 36 ft. long. Wells's plan shows a kind of projection or porch $VV'T'T$ against the wall UT, but of this I found no trace.

RS the main north wall of the north-east wing is 3 ft. 6 in. thick and 61 ft. long. Parallel to it and of the same length are the walls R_1S_1, R_2S_2. R_1S_1 is the inner wall containing the apartments in the north-east wing of the Governor's House. It is 3 ft. 6 in. thick, and is distant 21 ft. 9 in., internal measurement, from RS. The remains of SS_1, the east wall of this wing, are completely buried beneath the Custom House. The smaller walls rr_1 (two feet thick) qq_1, ss_1 (each

2 ft. 9 in. thick) divide off the space between RS and R_1S_1. The internal distance between SS_1 and ss_1 is 13 ft. 6 in.; between ss_1 and qq_1 it is 16 ft. 3 in.; betwen qq_1 and rr_1 it is 13 ft. 6 in.; between rr_1 and RR_1 it is 6 ft. R_2S_2 is the foundation wall carrying the arches of the north cloister. It is 41 ft. distant, internal measurement, from RS.[16] Where it directly supported the pillars of the cloister it is 4 ft. 6 in. thick, elsewhere it is 3 ft. 6 in. thick.

Other excavations were made on the site of the south-east wing of the factory (LL_2O_2O), in which the governor's apartments were situated, and considerable remains of its walls were discovered. The east wall of this wing LL_1L_2 was traced out, as also portions of the south main wall of the wing LO, the inner wall containing the apartments L_1O_1, and the wall carrying the pillars of the south cloister L_2L_2. These walls are all 4 ft. thick. The distance of L_1O_1 from LO is 17 ft. 6 in. and that of L_2O_2 from L_1O_1 is 35 ft. At the corner of this wing 17 ft. 6 in. south of L stood an isolated pillar 3 ft. square, L'. There is also a projecting chamber $MNN'M'$ built out against the main wall LO, the walls of which are 3 ft. thick, LM measures 11 ft. 6 in. The chamber $MNN'M'$ measures inside 18 ft. by 23 ft. The distance of L from the east curtain wall is 146 ft., that of S from the east curtain is 143 ft.: thus the north and south alignment of the Governor's House is very nearly parallel to the east curtain.

The South Curtain Wall.

I now pass on to speak of the south curtain wall and the arcades built within it. This side of the fort was in all probability used for storing the Company's goods. As originally constructed it had only two parallel lines of arches built along the inside of the curtain forming a double arcade and beyond these arcades, (*i. e.*, on their north side) was an uncovered raised terrace 22 ft. broad. Afterwards a portion of this raised platform was covered in by a third arcade. It also seems to have been found necessary to strengthen the south curtain wall by building another wall against it to support it. Lastly, in 1741, export and import wall houses were built on outside the south curtain. Evidently this side of the fort was subject to a good deal of alteration, and for this reason, or it may be from a desire to make the fort appear more symmetrical than it really was, Wells's plan comes far short of its usual accuracy. I have, accordingly, had some difficulty in determining the topography of this side of the fort, but my doubts have all yielded to patient excavation. The key to their solution was the discovery of the third or innermost of the lines of arches parallel to the south curtain.

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[16] This seems a little doubtful. The walls were very thick here, with a footing.

After making a careful search in every likely direction where I might expect to come across them, I find that the third line of these arches was built on the alignment of what is now the north face of the waggon shed in the Post Office yard. The foundations of this wall (D_3E_3) have been exposed. It is 2 ft. 6 in. thick and is built against another smaller wall 10 in. thick which is in contact with it, all along its south side but does not bond with it. There can be no doubt about the meaning of this. The smaller wall contained a raised terrace or platform in front of the arcades D_1F_1, D_2F_2. This platform was at first left open, but was afterwards covered in by an arcade, and a thick wall was built against the thin wall containing the platform to support the arches of the new arcade. Clearly then this wall D_3E_3 is the foundation wall of the third row of arches parallel to the south curtain. If this be so there can be no doubt about the situation of the curtain and the two other parallel lines of arches, of which in fact portions still remain standing. In the yard of the General Post Office there is an old arcade and arches which at its west end joins on to a very old house. This old house has been lately used as the store-godown of the Post Office, and the arches serve for a shed to keep the Post Office waggons in. The north side of the waggon-shed e_3i_3 is a modern wall constructed on the alignment of the third arcade wall of the old fort D_3E_3; but the two lines of arches e_1i_1, e_2i_2 (of which the first e_1i_1 forms the south face of the shed, and the second e_2i_2 runs down its centre) are manifestly portions of the first and second lines of arches D_1F_1, D_2F_2, which ran parallel to the south curtain of the old fort. This agrees with the traditions of the spot and has been proved by my excavations. The arcade $e_1i_1\ i_2e_2$ is a fragment. At its west end I find that four more of its pillars, $i_3i_4\ F_1F_2$, are built into the old Post Office godown; and on opening up the ground to the east of the arcade I found that the line of arches e_2i_2 has a foundation wall which runs on eastward underground as $e_2e'_2$, and that the line of arches e_1i_1 rests on isolated brick piers which are also continued eastward, and one of which I was able to expose e'_1.[17] Moreover the arcade $e_1i_1\ i_2e_2$ is a fragment of the old fort. It is built of the old thin bricks, the pillars are sunk deep below the present ground level. The foundation wall which carries the line of arches e_2i_2 is 3 ft. 4 in. thick. The production of this wall e_2i_2 is at a distance of 22 ft. 6 in. internal measurement from the wall D_3E_3 which I have identified as the foundation wall of the third or innermost line of arches parallel to the south curtain. This is just the distance which Wells's plan shows between the third and the second lines of these

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[17] It is 3 ft. 7 in. square at the top, and 4 ft. 8 in. square at its base.

arches, and hence I consider that e_2i_2 is a segment of the second line of arches. The pillars of these arches are 13 ft. 8 in. distant from each other from centre to centre. For similar reasons I identify the line of arches $e_1f_1f'_1g'_1g_1i_1$ as segment of the first of the lines of arches within the south curtain. The line of arches e_1f_1 is 19 ft. distant from the line of arches e_2f_2, by internal measurement. From e_1 to f_1, a distance of 42 ft. 9 in., it runs straight on parallel to e_2f_2. Then the whole line of arches is brought out 4 ft. 10 in. further south ($f_1f'_1$). Then again it continues to run parallel to the wall e_2i_2 for 82 ft. 10 in. ($f'_1g'_1$) after which it returns to its old alignment (g_1i_1). Both as regards its distance from the wall e_2i_2, which I have argued is the second line of arches parallel to the curtain, and as regards the irregularity of its conformation, the line of arches e_1f_1 $f'_1g'_1g_1i_1$ corresponds to the representation given in Wells's plan of the first line of arches within the south curtain, and I think there can be no doubt that it is a segment of that line of arches. Near the south-west corner of the old waggon shed a wall *ik* about 9 ft. thick projects in front of and parallel to the arches; another portion of it is hidden away in the old Post Office Store Godown. This is all that actually remains of the south curtain, but by opening up the ground in the yard of the Post Office I have been able to trace out its position and foundations. The original curtain wall was 3 ft. 2 in. thick. Within it, *i. e.*, on its north side, there was built another wall which was intended to support and strengthen the curtain wall. This wall is irregularly constructed and varies in thickness. At first it is about 3 ft. 8 in. thick with a space of 6 in. left in some places between it and the curtain wall. At *f* it ends in a buttress about 2 ft. 4 in. thick. The south curtain wall is met on its south face by a wall about 2 ft. 2 in. broad, at a point *h*, 53 ft. distant from *k* where the curtain is now cut away. The 2 ft. 2 in. wall runs southwards and a little to the eastwards, for a distance of 24 ft. Then it turns off eastwards. This wall is the wall shown in Wells's plan dividing the warehouses from the yard ω. Its discovery in the position indicated for it in Wells's plan places the identification of the south curtain wall beyond dispute.

I have already pointed out one serious inaccuracy in Wells's plan. He makes the east curtain inclined at an angle to the north and south alignment of the Governor's House in the Fort, whereas they really are parallel to each other. I have now to call attention to another serious inaccuracy in Wells's plan. I have shown that D_3E_3 is the northernmost of the three lines of arches built inside the south curtain wall. Its distance from the centre of the east gate in 162 ft. whereas Wells makes it only 150 ft.

The Writers' Buildings on the north side of the fort.

As regards the north side of the fort, I have not much to add to what Mr. Bayne discovered in 1883. I have, however, verified by excavation the position of the range of rooms which divided the fort into two, and which, I believe, to have been the 'Writers' Buildings' in the old fort. The south wall of these buildings, JG, is about 60 ft. distant from W, the north-west corner of the Governor's House. At J, 99 ft. from the west curtain wall, there is a passage through the block of buildings 15 ft. wide. The wall JG is 3 ft. 2 in. broad,[18] north of it, and parallel to it, at a distance of 19 ft. internal measurement, is a wall $J_1 j_2$. I also found a cross wall $j_2 j_3$ to the west of $J J_1$ and distant from it 24 ft. internally. These cross walls $J J_1$, and $j_2 j_3$, are 2 ft. 1 in. thick, $J_1 j_2$ is 2 ft. thick. East of the passage we have no continuous wall corresponding with JG, but we find instead the bases of a row of columns YZ. These bases are 11 ft. apart from centre to centre, and measure about 3 ft. by 2 ft. each. At a distance of 9 ft. internally from the row of columns and parallel to it, is an inner wall Y_1Z_1, 2 ft. thick. The wall $Y Y_1$ is 2 ft. 8 in. thick. I have not thought it necessary to trace out the walls YZ, Y_1Z_1, along their whole length. I have merely exposed Z_1, the termination of the wall Y_1Z_1, where it meets the wall $Z_1 Z$. The south face of the wall Y_1Z_1 is here 22 ft. 6 in. distant from the wall of the present Custom House. Z_1 is also about 190 ft. from the centre of the east gate of the fort, and 30 ft. from the east curtain wall by internal measurement. The whole length of wall Y_1Z_1 internally is 174 ft. 6 in. The breadth of Y_1Z_1 and $Z Z_1$ is 2 ft. All these walls are of poor construction. The buildings here were, in fact, low, one-storied structures, as is evident from the old views of the fort. This also agrees with the supposition that they were inhabited by the writers, for we gather from the records[19] that their lodgings were very damp and unhealthy.

The west curtain.

As regards the west curtain I have little to say. Its alignment was determined by Mr. Bayne. I have verified it by excavation at three different spots X_1, X_2, X_3. At X_1 near the south-west bastion of the fort, the curtain wall is unusually thick and measures 6 ft. This is probably due to the same cause which led to the strengthening of the south curtain wall in this direction.

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[18] I have not been able to trace this wall westwards from J for more than about 40 ft. At this point the remains became very confusing. I could only find a small wall 1 ft. 10 in. broad which met the thicker 3 ft. 2 in. wall on its northern face, and which I traced westwards up to the west curtain.

[19] See a letter from the Court of Directors, February 11th, 1756, para. 69, in Long's *Selections*.

The East Gate and the east side of the fort.

It now remains for me to speak of the east side of the fort. The central line of the east gate is 427 ft. from the corner of the north-east bastion, the position of which was fixed by Mr. Bayne in 1883. the gate measures internally 20 ft. from north to south and 36 ft. from east to west. The east face measures externally 26 ft. 6 in. Its salient angles $B\ B'\ C'$, $B'\ C'\ C$ are angles of 120 degrees. The walls are 4 ft. thick. The south wall of the gate $C'\ C_1\ C_2$ was pierced by a drain which was met at an angle by a second drain running north-east.

On each side of the east gate there ran a double row of arches A_1B_1, A_2B_2, and C_1D_1, C_2D_2, parallel to the east curtain wall AB, CD. The space between the curtain wall and the line of arches next to it (*i. e.* between AB and A_1B_1 and between CD and C_1D_1) was divided up by cross walls into chambers. The second row of arches A_2B_2, C_2D_2 supported the verandah or piazza which extended on each side of the gate before the ranges of chambers.

The rooms north and south of the gate.

As regards the rooms to the north of the gate between the east curtain and the line of arches A_1B_1, there is little to say. Wells's plan shows that the first cross wall occurred after the fifth arch. The arches thus cut off were left open to the verandah and formed the north court of guard. But the whole interest of these investigations centres in the topography of the range of rooms on the other side of the gate where were situated the court of guard, the barracks, and the Black Hole spoken of by Orme and Holwell. There is no doubt about the position of the curtain wall (CD) and the parallel lines of arches within it (C_1D_1, C_2D_2). They have been traced out from the east gate right up to the north face of the General Post Office. The curtain wall CD is 3 ft. 9 in. thick. The foundation wall which carried the first line of arches C_1D_1 is 2 ft. 9 in. thick, that which carries the second line of arches C_2D_2 is 2 ft. 3 in. thick. Between the curtain wall and the wall C_1D_1 is a distance of 14 ft. 10 in. and between the curtain and C_2D_2 a distance of 31 ft. 3 in. from inside to inside. The wall C_2D_2 meets the wall D_3E_3 at a distance of 162 ft. from the centre of the east gate. So far the topography of this part of the fort is perfectly clear.

The cross walls south of the gate.

There is, however, considerable difficulty in determining the positions of the cross walls which sub-divided the space between CD and C_1D_1 into rooms. Here, as I noticed before, Wells's plan is quite inaccurate. It shortens the distance between the east gate and the south-east bastion, and so vitiates its whole representation of this corner of the fort. In the case of the cross walls it is not easy to check the errors of the plan by actual excavation, for we cannot always expect to find trace of the cross walls which may have been very slightly constructed. As a matter of fact only two cross walls have been actually discovered by excavation. One of these dd_1, was found by Mr. Bayne in 1883 and was again brought to light by me in 1891. This wall is 1 ft. 6 in. thick, and is 145 ft. 6 in. from the centre of the east gate. Mr. Bayne thought that this wall was the north wall of the Black Hole, I shall show that it is probably the south wall of the prison. The other cross wall (bb_1) is a much more solid wall than the wall just described (dd_1). It is 2 ft. thick and is at a distance of 100 ft from the centre of the gate.

The position of two other cross walls may be inferred in the following way. A little to the south of cross wall bb_1 there was a subterranean chamber or vault $b'b'_1 c'c'_1$ which attracted much notice when it was first discovered. Internally this vault measured 19 ft. 3 in. north and south, by 9 ft. 9 in. east and west. It was 7 ft. 2 in. deep. Its walls were 1 ft. 6 in. thick and were covered with a hard coating of plaster. The floor over the vault was carried across by four beams, the holes where the ends of the beams rested being clearly visible. The west wall of the vault ($b'_1 c'_1$) was built against the foundation wall of the first line of arches $C_1 D_1$. The north face of the north wall of the vault $b'b'_1$ was 3 ft. 3 in. distant from the south face of the cross wall bb_1. The internal distance between the east wall of the vault ($b'c'$) and the curtain was 2 ft. 3 in. In this part of the curtain wall (bc) an iron grating was found, built up inside the brick work of the wall just below the level of the floor. It seems to have served no special purpose. The south wall of the vault $c'c'_1$ was coated with plaster on both sides. Its north face was plastered down to the level of the floor of the vault. Its south face was plastered down to a foot below the level of the floor of the chambers along the east curtain. This would seem to show that wall $c'c'_1$ was continued up above the floor level so as to form a cross wall cc_1 dividing up the space between bb_1 and dd_1, and, I believe, that this was so because there must surely have been a cross wall between bb_1 and dd_1, and I do not see where else it could have been conveniently placed except above $c'c'_1$ as cc_1. The north face of this wall will be distant 126 ft. from the centre of the east gate.

There is somewhat similar evidence for the existence of another cross wall aa_1 north of bb_1. Inside the curtain wall (at ab) there was built another wall $a'a'_1$ 1 ft. 6 in. and 24 ft. long which was carried up to within a foot of the floor level of the range of chambers along the east curtain. This wall and the north face of the wall bb_1 were plastered to a depth of about 7 ft. below the floor level almost to the foundation of the walls. This seems to show that there was another vault immediately north of the wall bb_1, and that the wall $a'a'_1$ carried the flooring of the room above. As the wall $a'a'_1$ is about 24 ft. long, I infer that this was the length of the vault and also of the room above it and, I think, that at 24 ft. north of bb_1 there was another cross wall like bb_1 which below the floor level served as the north wall of a vault and above the floor level was a cross wall sub-dividing the space between the curtain and C_1D_1.

In this way I have been able to prove by excavation the existence of four cross walls aa_1, bb_1, cc_2, dd_1. But this is not enough. It is still necessary to consider whether, as Wells's plan implies, there were any other walls besides these four, and in particular whether there were any to the south of dd_1. For the Black Hole was the southernmost of the rooms built along this part of the east curtain. Consequently its site must be immediately to the north of the last cross wall, and its site is known if the position of the southernmost cross wall is known. I have accordingly traced out the wall C_1D_1, which contained the chambers built against this part of the east curtain, to a point d'_1, 166 ft. from the centre of the east gate, where this containing wall stops. Beyond d'_1 there is only a small thin wall, built, I suppose, to contain a pavement. There could have been no cross walls beyond d'_1, and I have found no trace of any between d_1 and d'_1. It therefore follows that dd_1 is the southernmost cross wall. I have also traced out the east verandah wall C_2D_3 to D_3, 166 ft. from the centre of the east gate, where C_2D_3 meets the wall D_3E_3 which carried the third or innermost line of arches on the south side of the fort. Thus my excavations prove that dd_1 is the southernmost cross wall, and that it occurred at about 20 ft. north of the end of the containing wall C_1D_1, and also at about the same distance north of the junction of the verandah wall C_2D_3 with the third line of arches on the south side D_3E_3.

Comparison of Wells's plan with the results of excavation.

This also agrees on the whole with Wells's plan which represents the last cross wall as occurring about 16 ft. or 18 ft. north of the end of the containing wall and of the junction between the east verandah wall and the inner line of arches on the south side of the fort. Wells's plan, however, does not exactly agree with the results obtained by excavation as to distances, but this is accounted for by the fact that the length of the curtain wall between the east gate and the south-east bastion is too short by about 12 feet. Whoever it was, who actually drew the plan, he did not discover his mistake till he came to put in the details of the rooms along the east curtain south of the gate. Then, finding that there was not sufficient room to put those details in properly, he crowded them in together, This, I think, is clearly the case with the cross walls. The discrepancies between Wells's plan and the results obtained by actual excavation may be exhibited as follows :—

Wells's plan shows walls at	43,	70,	95,	108,	122,	135 ft.	from the centre of
Excavation shows walls at		75,	100,		126,	146 ft.	the East gate.

Looking at this comparative table, and remembering that Wells's distances are short of the true distances, we easily discover which walls correspond. The first cross wall shown by excavation (aa_1) corresponds to the second wall given in Wells's plan. The second cross wall shown by excavation (bb_1) corresponds to the third wall in Wells's plan. The fourth cross wall shown by excavation (cc_1) corresponds to the fifth wall in Wells's plan ; and the last wall in Wells's plan corresponds to the last wall shown by excavation. The two missing walls not shown by excavation are the first cross wall of Wells's plan, which was the south wall of the barracks (μ), and the fourth wall of Wells's plan which must have come between bb_1 and cc_1. This wall could not have been a very substantial one, as it must have been built over the subterranean chamber $b'b_1'\ c'c_1'$. The room π in Wells's plan, which is the southernmost of the series of rooms built within this part of the east curtain, and is, therefore, the Black Hole, corresponds with the space $cc_1\ dd_1$. This is the site of the Black Hole. As regards the staircase to the south-east bastion, I have unfortunately very little to say. This staircase is mentioned by Holwell and is shown by Wells in his plan. It is a long staircase. Its head is put by Wells at about 8 ft. from the south face of the southernmost cross wall, and its foot at a distance of about 50 ft. I have not been able to find any trace of it by excavation, but I see no reason for doubting its position to be correctly marked by Wells.

Arrangement of the rooms along the east curtain.

If I might be permitted to make a few conjectures I should arrange the rooms along the east curtain thus. The whole range of rooms is contained between the south wall of the east gate $CC_1\,C_2$ and the cross wall dd_1 and between the east curtain CD and the first line of arches parallel in the curtain C_1D_1. The pillars of these arches were about 8 ft. 9 in. distant from each other from centre to centre. West of them came a second parallel line of arches, C_2D_2 forming the piazza before the rooms. The first of the cross walls dividing off the rooms occurred after the fourth arch in the first line of arches C_1D_1. Thus it would be about 35 ft. distant from the wall $CC_1\,C_2$. These four arches were left quite open to the piazza west of them, and formed the court of guard south of the gate. Three arches further on was another cross wall aa_1. If this wall occurred exactly after the seventh of the first line of arches C_1D_1 and I am right in believing that these arches measured 8 ft. 9 in. from centre to centre, then the centre of the cross wall aa_1 would be 61 ft. 3 in. from the south face of the wall $CC_1\ C_2$. If we rely on the evidence of the excavations its north face was 60 ft. 3 in. from the south face of $CC_1\ C_2$. The next cross wall bb_1 occurred after the tenth arch. As shown by the excavations its north face was 86 ft. distant from the south face of the wall $CC_1\ C_2$, or if we reckon its distance according to the arches, its centre will be 87 ft. 6 in. from $CC_1\ C_2$. I have argued that another cross wall cc_1 was 126 ft. distant from the centre of the east gate, that is its north face is 112 ft. from the south face of $CC_1\ C_2$; and if we reckon that this wall came after the thirteenth arch its centre will be 113 ft. 9 in. from $CC_1\ C_2$. The last cross wall dd_1 is 131 ft. 6 in. from $CC_1\ C_2$, or if we reckon that it came after the fifteenth arch its centre would be about 131 ft. 3 in. distant. The room cut off by the walls cc_1, dd_1, is the Black Hole. It measured internally 18 ft. by 14 ft. 10 in. It was bounded on the east by the curtain, on the south by the wall dd_1, on the north by the wall cc_1, and on the west by the fourteenth and fifteenth arches of the first line of arches parallel to the east curtain C_1D_1. These two arches were bricked up and only a window was left in the centre of each. Along the east wall of the Black Hole was a wooden platform about six feet broad and raised three or four feet from the ground, open underneath. It probably projected from the east wall as far as the door in the north wall cc_1. This door opened inwards. The three rooms between the court of guard and the Black Hole were the barracks. They were bounded on the east by the curtain wall, along which ran a wooden platform similar to that in the Black Hole. The nine arches which bounded the barracks on the south, (*i. e.*, the fifth to the thirteenth arches inclusive) were partially closed by a dwarf wall, or, as Holwell calls it, a parapet wall. The rooms opened one into another and a door in the wall cc_1 led to the Black Hole. South of the Black Hole there were no more rooms, the remaining space being taken up by a straight staircase, fifty feet long, built against the east curtain wall, leading to the south-east bastion.

I believe that this arrangement of the rooms will satisfy all the requirements of Holwell's narrative. The barracks according to him would have been a fairly comfortable place for 146 persons to spend the night in. I make the whole area of the barracks to be 72 ft. by 14 ft. 10 in. This gives 7 sq. ft. 45 sq. in. for each individual. The area of

Black Hole is 18 ft. by 14 ft. 10 in. This allows just 267 sq. ft. of area for 146 persons, or less than 2 sq. ft. each.[20]

Difference between these views and those of Mr. Bayne.

The result of all this fresh discussion is to place the site of the Black Hole prison immediately to the north of the site fixed for it by Mr. Bayne, so that Mr. Bayne's conclusion was not so far wrong. Mr. Bayne, however, arrived at his conclusion from two utterly false premises. His first premise was that the south-east corner of the fort was just like the north-east corner. This was completely refuted by Mr. Munro in 1889 when he produced Wells's plan of the fort. Mr. Bayne's second premise was, that the dimensions of the fort stated by Orme in the text of his history and shown in the accompanying plan, were absolutely correct, and Mr. Bayne still held to this belief even though he discovered that there was an error somewhere in Orme's plan when he tried to superpose it upon Simms's Survey of Calcutta. The excavations which I have made prove that the dimensions given by Orme are only approximately correct, accurate enough for the purposes of his history, but not accurate enough for the purpose of settling minute points of topography. Fortunately for Mr. Bayne, the errors of his two premises counteracted each other, and thus, when he made an excavation in the passage north of the General Post Office, where he expected to find the Black Hole, he actually did come across one of its walls. But, like words, walls cannot be interpreted apart from their context. Mr. Bayne was prevented at the time from finding the right context, and he therefore failed to understand these walls; I have merely been more fortunate in my opportunities, and have been able to secure the right context.

Miscellaneous points.

Only a few more miscellaneous points as to the topography of the old fort remain to be mentioned. Besides the two drains already spoken of, which I found by the east gate, I also came across a piece of another old surface drain running along the west side of the verandah which extended before the chambers built inside the east curtain. This drain is 4 ft. wide at the top and 2 ft. at the bottom. Its eastern edge is 5 ft. distant internally from the verandah wall C_2D_2. There is also an old well about 50 ft. east of the east wall of the Governor's House in the fort, and 23 ft. south of its central line, which may have been part of the old building. The main walls of the buildings are brick in lime, the minor walls are brick in mud. The parade ground is paved with brick on edge over one flat, covered with six inches of concrete. Its level was visible everywhere in section. If we reckon the level of the curb stone of the footpath in Dalhousie Square as 100 ft. then the level of the parade ground would be 98·07 ft., *i. e.*, a little less than 2 ft. lower down. The level of the floors of the rooms varied. The level of the floor over the subterranean vault was 99·24 ft. At about the middle of the set of rooms built along the east curtain it was 98·5 ft.

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[20] The only cross wall shown in Wells's plan which I have not accounted for is the wall between the rooms ν and o. If what I have said as to the other cross walls is correct, this cross wall should come between bb_1 and cc_1. It could not then have been a substantial wall as it would have been built over the subterranean chamber $b'b'_1\,c'c'_1$. Could this wall have been meant for the wall $b'b'_1$?

A Specimen of the Padumāwati.—By

G. A. Grierson, B.A., I.C.S.

The following is an attempt to give a correct text of a portion of the Padumāwati,[1] or Padmāvatī of Malik Muḥammad of Jāyas in Oudh. He flourished under Shēr Shāh in the year 1540 A. D., and numerous MSS. of his great poem are in existence.

The value of the Padumāwati consists chiefly in its age. Malik Muḥammad is, I believe, the oldest vernacular poet of Hindūstān of whom we have any uncontested remains. Chand Bar'dāī was much older, but the genuineness of his Prithīrāj Rāy'sā is denied by many competent scholars. Vidyāpati Ṭhākur, who lived in the year 1400 A. D. has only left us a few songs which have come down to us through five centuries of oral transmission, and which now cannot be in the form in which they were written. The preservation of the Padumāwati is due mainly to the happy accident of Malik Muḥammad's religious reputation. Although profoundly affected by the teaching of Kabīr, and familiarly acquainted with Hindū lore, and with the Hindū Yōga philosophy, he was from the first revered as a saint by his Muḥammadan co-religionists.

He wrote his poem in what was evidently the actual vernacular of his time, tinged slightly with an admixture of a few Persian words and idioms due to his Musalmān predilections. It is also due to his religion that he originally wrote it in the Persian character, and hence discarded all the favourite devices of paṇḍits, who tried to make their language correct by spelling (while they did not pronounce) vernacular words in the Sanskrit fashion. He had no temptation to do this. The Persian character did not lend itself to any such false antiquarianism. He spelled each word rigorously as it was pronounced. His work is hence a valuable witness to the actual condition of the vernacular language of Northern India in the 16th century. It is, so far as it goes, and with the exception of a few hints in Alberuni's Indica, the only trustworthy witness which we have. It is trustworthy, however, only to a certain extent, for it often merely gives the consonantal frame work of the words, the vowels, as is usual in Persian MSS., being generally omitted. Fortunately, the vowels can generally be inserted correctly with the help of a few Dēvanāgarī MSS. of the poem which are in my possession.

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[1] The author himself invariably spells the word thus.

Besides its interest as a key to a philological puzzle, the Padumāwati also deserves notice for its contents. In itself it is a fine poetical work, and one of the few original ones, not dealing with either Rāma or Kṛishṇa, with which I am acquainted in any Indian language. It is also remarkable for the vein of tolerance which runs through it,—a tolerance in every way worthy of Kabīr or of Tul'sī Dās. The story of the poem has been a favourite one with eastern authors. Husain Ghaznawī wrote a Persian poem on the subject, entitled *Qissae Padmāwat.* Rai Gōbind Munshī in 1652 A. D. wrote a version in Persian prose, called (after the chronogram of its date) *Tukfatu'l-Kulūb.* Again Mīr Ziyāu'd-dīn 'Ibrat, and Ghulām 'Alī 'Ishrat wrote a joint version in Urdū verse in 1796 A. D. Malik Muḥammad's poem was written in 1540 A. D.

Concerning the author little is known. He tells us himself that he was the disciple of Sayyad Muḥīu'd-dīn. He studied Sanskrit Prosody and Rhetoric from Hindu Paṇḍits at Jāyas. He belonged to the *Chistiyā Niẕāmiyā*, that is to say, he was the eleventh disciple in descent from the well-known Niẕāmu'd-dīn, who died in 1325 A. D. Muḥīu'd-dīn's teacher was Shaikh Burhān, who resided at Kalpī in Bundēl'khaṇḍ, and who is said to have died at the age of a hundred years in A. D. 1562–63. The poet was patronized by Shēr Shāh.

The only other fact which we know for certain is that he was blind of one eye. I have collected the following traditions about him. One of Shēr Shāh's allies was Jagat Dēv, (enthroned 1527 A. D.: died 1573 A. D.), Mahārāj of Ghāzīpur and Bhoj'pur. He was present at the battle of Bagh'sar (Buxar) in which Shēr Shāh defeated Humāyūn. Malik Muḥammad is said to have attended his court. Two of Malik Muḥammad's four friends, whom he mentions in his poem (22) were also patronised by Jagat Dēv. These were Yūsaf Malik and Salōnē Siŋgh (whom Malik Muḥammad calls Miyā̃ as if he was a Muṣalmān). It is said that another attendant at Jagat Dēv's court was a *Katthak*, named Gandharv Rāj, who was skilled in the art of singing. Malik Muḥammad was greatly attached to him and gave him his blessing, prophesying that skill in song would always remain in his family, and, at the same time, begging him to take, as a sign of affection, his title of Malik. Ever since, Gandharv Rāj's descendants have called themselves Malik, and members of the family still live in Talūkā Raipurā and at Haldī in Baliyā District, and are renowned singers.

It is said that the Rājā of Amēṭhī was childless, but was granted a son, in consequence of the prayers of Malik Muḥammad. When the poet died, he was buried at Amēṭhī, and his tomb is still shown, and worshipped by believers. Malik Muḥammad's two friends, Malik Yūsaf and Salōnē, died in what is now the district of Gōrakh'pur, from a surfeit of mangoes. Malik Muḥammad was with them at the time, and himself narrowly escaped. The mangoes are said to have been infested by poisonous insects.

The text of the Padumāwati, being in the ṭhēṭh Hindī language, and written in the Persian character, is very difficult both to read and to understand. It has been frequently transliterated into the Nāgarī character, but the transcriptions, whether MS. or printed, are full of mistakes, generally guesses to make the meaning clear. The best transliterated edition is that by Paṇḍit Rām Jasan of Banāras; but even in his case (putting instances of sanskritization out of sight) hardly a line is correct. There are several printed editions in the Persian character, but they too are all incorrect. I have been fortunate enough to become possessed of several old MSS. of the poem in the Persian character, and by diligent comparison I have endeavoured to reproduce, in the Nāgarī character, the actual words written by the poet. A glance at the critical notes will show the labour involved in the task. I have also endeavoured to give a tentative translation of text as I went along.

To the text, I append an analysis of the whole poem, which may prove interesting. It must, however, be understood that I do not guarantee its entire correctness. There are many passages which I do not yet understand, and which await further examination. I hope, in process of time, to publish, jointly with Mahāmahōpadhyāya Paṇḍit Sudhākara Dvivēdī, F.A.U., a complete and satisfactory edition of the whole poem. Of that edition, the present specimens may be taken as a provisional sample, and I shall be most grateful for any suggestions which reach me in time to improve the larger work.

For the purposes of these specimens, I have used the following MSS.:—

A. MSS. in Persian character (marked collectively as P).

(1) India Office Library, Pers. Cat. 1018. Dated 1107 Hij. = 1695 A. D. (Ia).

(2) Ditto No. 1975. Vowel marks freely used. Correctly written. Dated 1109 Hij. = 1697 A. D. (Ib).

(3) Ditto No. 1819. Vowel points inserted in red ink by a later hand. Dated 1114 Hij. = 1702 A. D. (Ic).

(4) India Office Library, Urdu Catalogue, No. 3130. Few vowel points. In two different handwritings. No date, (Id).

All these Persian MSS. are very fairly correct. I have taken Ib. as the basis throughout.

B. MSS. in the Dēva Nāgarī character (marked collectively as N).

(1) India Office Library, Sanskrit Catalogue, No. 2471. A magnificent copy, profusely illustrated. Written by Thānā Kāyath of Mirzāpur. No date. Spelling highly Sanskritized (Is).

I must here express my thanks to Dr. Rost, and the authorities of the India Office Library, for the loan of the above MSS.

(2) A well written copy kindly lent me by Kavirāj Syāmal Dās, belonging to the library of the Mahārāj of Udaipur. Spelling not so Sanskritized. Dated Sambat 1895 = 1838 A. D. (U).

C. MS. in the Kaithī character.

(1) A clearly written copy. With very irregular spelling: and many important variations in the readings. Written in Sambat 1812 = 1755 A. D. (K).

In editing the text I have adopted the following principles as regards spelling. Prākṛit words are spelt as in the Persian copies. When the Persian copies give vowels, those vowels are adopted. When no vowels are given, I have used my judgment in adopting the vowels given in the Dēvanāgarī and Kaithī copies.

On the other hand, for precisely similar reasons, I have generally adopted the spelling of Arabic and Persian words which is best vouched for by the Dēvanagarī and Kaithī copies. Such words are phonetically spelt in that alphabet.

U and K uniformly write ष as ख. I have not followed them in this. When U, as it frequently does, gives a short *u* as the final vowel of a Prākṛit substantive, I have generally adopted it, unless the use of the vowel is contradicted by the Persian copies.

The termination نھ *nh*, is capable of being read as equivalent to either the plural oblique termination न्ह, or to the singular oblique termination हिँ or हि Unless the context showed that न्ह is required, I have transliterated it हि. Even in the best Persian MSS. the nasal is inserted so capriciously, that it is at least doubtful whether it should be used in the singular, and I have accordingly followed the best Dēvanāgarī MSS., in omitting it, in this case, throughout.

The metre of the poem consists of stanzas of seven *caupāīs* followed by a *dōhā*. In the latter, a *mātrā* is frequently omitted in the first half. In the *caupāīs*, accent is frequently used instead of quantity, a short accented syllable being treated as a long one, especially at the end of a line. Malik Muḥammad wrote long before Kēçav Dās laid down the canons of Hindī metre. Such accented short syllables I have marked, in transliteration with an acute accent, thus,—*niramárē* (II, 3).

I regret that the scheme of transliteration into the Roman character is not that usually adopted in this *Journal*. For various reasons, which it is not necessary to give here, I have been compelled to adhere more closely to that used in the Bihārī Dictionary by Dr. Hoernle and myself.

SCHEME OF TRANSLITERATION ADOPTED IN THIS PAPER :—

अ *a*, आ *ā*, इ *i*, ई *ī*, उ *u*, ऊ *ū*, ए *e*, ए *ē*, ओ *o*, ओ *ō*. ँ ˜, thus अँ *ã*, आँ *ā̃*, इँ *ĩ*, ईँ *ī̃*, and so on. ं *ṃ*.

The following vowels occur only in a few Sanskrit words, ऋ *ṛi*, ऐ *ai*, औ *au*. In Tadbhava words ऐ and औ do not occur. अइ is transliterated *ai* and अउ *au*. In Nāgarī MSS. when ऐ and औ occur they are plainly stenographic signs for अइ and अउ. This is frequently shown by the metre. There is no danger of confusing अइ, अउ, and ऐ, औ, for they appear in distinct classes of words, अइ, अउ, are always in Tadbhava words, or in corrupted Tatsama words, ऐ and औ occur only in words lifted bodily from Sanskrit:—

क *k*, ख *kh*, ग *g*, घ *gh*, ङ *ŋ*.
च *c*, छ *ch*, ज *j*, झ *jh*, ञ *ñ*.
ट *ṭ*, ठ *ṭh*, ड *ḍ*, ढ *ḍh*, ण *ṇ*.
त *t*, थ *th*, द *d*, ध *dh*, न *n*.
प *p*, फ *ph*, ब *b*, भ *bh*, म *m*.
य *y*, र *r*, ल *l*, व *w*, (or in Sanskrit words *v*).
ष *ṣ*, स *s*, ह *h*.

श only occurs in Persian words, representing the Persian ش, or in pure Sanskrit words. In the former case it is transliterated *sh*, and in the latter by *ç*.

Arabic and Persian letters.

ث *s̱*, ح *ḥ*, خ *kh*, ذ *ẕ*, ز *z*, ژ *zh*, ص *ṣ*, ض *ż*, ط *ṭ*, ظ *ẓ*, ع ‘, غ *gh*, ف *f*, ق *q*.

अथ असतुति खंड ॥ १ ॥

चौपाई ।

सवँरउँ आदि एक करतारू । जेइ जिउ दीन्ह कीन्ह संसारू ॥
कीन्हेसि प्रथम जोति परगासू । कीन्हेसि तेहि परबत कबिलासू ॥
कीन्हेसि अगिनि पवन जल खेहा । कीन्हेसि बहुतइ रंग उरेहा ॥
कीन्हेसि धरती सरग पतारू । कीन्हेसि बरन बरन अउतारू ॥
कीन्हेसि सपत दीप ब्रहमंडा । कीन्हेसि भुअन चउदह उ खंडा ॥
कीन्हेसि दिन दिनिअर ससि राती । कीन्हेसि नखत तराइन पाँती ॥
कीन्हेसि सीउ धूप अउ छाहाँ । कीन्हेसि मेघ बीजु तेहि माहाँ ॥

दोहा

कीन्ह सबइ अस जा कर दोसर छाज न काहि ।
पहिलइ तेहि कर नाउँ लेइ कथा करउँ अउगाहि ॥ १ ॥

Critical notes.

1. 2. *Kīnhesi*, so apparently Ib, which seems to vocalize the final س. The word may, however, be also read *kīnhisa* for *kīnhesa*. The other copies in the Persian character simply have کینهس, which may be read either *kīnhesi*, *kīnhasi*, or *kīnhasa*. Is and K have *kīnheçi* for *kīnhesi*. U has *kīnhasa*. Throughout the poem a short *e* is inserted to form the past tense. Thus, *dēkhasi*, he sees, *dēkhesi*, he saw. Ia *tinhahi prīti kabilāsū*, Ibc *parabata kabilāsū*, Id *parabata kailāsū*, Is *tēhi prīti ka bilasū*, U *tihi parabata ka bilāsū*. In the Persian character پریت and پربت and کیلاسو and کبلاسو are easily confused. In each case it is a question of a dot. There can be no doubt about the form *kabilāsū* for *kailāsū* being right. The word is of frequent occurrence in the poem, and is invariably spelt thus in the best MSS. It is a curious corruption, and has puzzled all copyists with Sanskrit predilections. 3. Ib has *pawana agini*, K *agni pauna*, Is *bahutai*, UK *bahutē*, P give no clue. 4. Is *awatārū*.

5. Ia *kīnhesi sapata dīpa brahamaṇḍā*
Ib ,, ,, *lōga* ,,
Ic ,, *sāta saraga* ,,
Id ,, (illegible)? *sēta pēta mahī bhaṇḍā*
Is *kīnhesi sata sata brahamaṇḍā* (*sic*)
U *kīnhasa sāta saraga* ,,
K *kīnhesi* ,, *dīpa* ,,

Two printed editions follow Ia, except having *mahī* instead of *dīpa*. Ia is adopted as making the best sense. 6. Ib *duniara*, U *dinakara*, K *duniā*. Printed editions *dinēsa*. 7. Is *kīnhesi sīta ghāma*. 8. Id *kīnhasi saba asa*. Ias *dusarahi*, U *dusarahu*. 9. Ia *tā kara nāu*, K *karatā kai nāū lei*, Ia *kathā kahaū*, Id ارگاه, Is *arigāhu*, printed editions and K *uragāhu*.

Translation.

(1). I bear in mind that one and only primal Maker, who gave life and made the world. First made He manifest the Light, then made He (for the Light) the mighty mountain Kailāsa.[1] He made the fire, the air, the water, and the dust. He made forms[2] of varied hue. He made the Earth, and Heaven, and Hell; and he made incarnations in many persons.[3] He made the mundane egg[4] with its seven[5] regions. He made the universe with its fourteen[6] worlds. He made the sun for the day, and the moon for the night; He made the asterisms and the systems of the stars. He made coolness, sunshine and shade; He made the clouds and lightning (that abideth) in them.

All things are so made by Him, that naught is worthy to be compared with Him. First take I His name, and then in deep thought do I begin[7] my story.

चौ॥ कीन्हेसि सात उ समुंद अपारा। कीन्हेसि मेरु खिखिंद पहारा॥
कीन्हेसि नदी नार अउ झरना। कीन्हेसि मगर मच्छ बहु बरना॥
कीन्हेसि सीप मोंति तेंहि भरे। कीन्हेसि बहुतइ नग निरमरे॥
कीन्हेसि बन-खँड अउ जरि मूरी। कीन्हेसि तरिवर तार खजूरी॥
कीन्हेसि साउज आरन रहहीं। कीन्हेसि पंखि उडहिं जहँ चहहीं॥
कीन्हेसि बरन सेत अउ स्यामा। कीन्हेसि नींद भूख बिसरामा॥
कीन्हेसि पान फूल रस-भोगू। कीन्हेसि बहु अउखद बहु रोगू॥

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[1] By 'Light,' the poet refers to Mahādēva, who dwells in Kailāsa Indian Muṣalmāns frequently consider Adam, the first man, as the same as Mahādēva. The fact that the poet expressly says that Kailāsa was made 'for' the Light, shows that he cannot be referring to light, the first of created things.

[2] An Urdū gloss. translates *urēha* by نقش, design, stamp, drawing. I have noted it also in 48, 4; 506, 5, *asa mūrata kē daī urēhi*, and in 510, 3, *bhaī urēha puhupa saba nāmā*. In the second the Urdū translation gives ظاهركي and in the latter, the whole line is translated تو يهه معلوم هوتا تها كه رنگ برنگ پهول هر قسم کے هين. The word is still used in Oudh and Bihār by women, in the sense of *racanā*. It is derived from the Skr. *ullēkha*.

[3] Apparently, incarnations in many castes. Alluding to the doctrine that incarnations have occurred in all religions in many parts of the world. Or it may only refer to the various *avatārs* of Viṣṇu.

[4] *I. e.*, the universe, alluding to the well known tradition detailed in Manu.

[5] Jambu, Plakṣa or Gōmēdaka, Çālmalī, Kuça, Krauñca, Çāka, and Puṣkara.

[6] There are seven worlds (lōka) above, *viz.*, Bhūr-lōka, Bhuvar-l., Svar-l., Mahar-l., Janar-l., Tapar-l., and Satya-l. or Brahma-l., and seven below, *viz.*, A-tala, Vi-tala, Su-tala, Rasā-tala, Talā-tala, Mahā-tala, and Pātāla. According to Musalmāns, there are seven regions (طبق) above (these are heavens), and seven below (earths).

[7] Two Urdū glosses translate *augāhi* by شروع, a meaning for which I can find no other authority. It means literally to plunge into water, hence to be immersed in anything, to have the mind fully occupied.

दो ॥ निमिख न लाग करत ओहि सबहि कीन्ह पल एक ।
गगन अंतरिख राखा बाजु खंभ बिनु टेक ॥ २ ॥

2. 1. *Sāta-u*, so Ib, Ia U K have *hēma* (U reverses the order of the two hemistichs), Is *hīwa*, Ic *sātō* with *hēma* as a v. l. on margin. Id *sāta* (also Rām Jasan), Ic? *bāwara*; کھکھند (Sanskrit किष्किन्ध for कुखण्ड) evidently puzzled the Nāgari transcribers. Is has *khaṇḍa khaṇḍa*, U *kīnhasa parabata mēru apārā*. The P copies are undecided between *khikhinda* and *khikhiṇḍa*. The former is probably the correct reading. 2. K *mācha*. 3. U *wahu bhārē*, K *jehi bhālē*, *niramálē*. 5. U *ráhai*, *cáhai*, N *uḍai*. 7. U *phūla au*, Id K *aukhadha*. 8. Ia *gagana antaricha*, Ic *gagana antarikha*, Ib *khā̃bha*, U *lagai*, *rākhai*, K *nimikhi*, *karata tehi sabhai kīnha chana ēka*. Ias have *ohi*, Ibcd U *wahi*.

2. He made the seven[1] shoreless oceans, &c., and He made the mountains of Mēru and Kukhaṇḍa.[2] Rivers made He and streams and waterfalls; crocodiles and fish made He of many kinds. He made the oyster shell, and the pearl which filleth it, He made many flawless gems. Forests made He and roots[3]; tall trees made He, palmyras and date palms He made the wild animals[4] which dwell in the forest; He made the fowl which fly where they will. He made colours, white and black; He made sleep, and hunger, and rest. He made the betel-leaf and flowers, and the pleasures of taste; many medicines made He and many sicknesses.

He made them in less than the twinkling of an eye; all made He in a single instant. He fixed the Heavens in space without a pillar and without a prop.

चौ ॥ कीन्हेसि मानुस दीन्ह बडाई । कीन्हेसि अन्न भुगुति तेहि पाई ॥
कीन्हेसि राजा भूँजइ राजू । कीन्हेसि हस्ति घोर तेहि साजू ॥
कीन्हेसि तेहि कहँ बहुत बिरासू । कीन्हेसि कोइ ठाकुर कोइ दासू ॥
कीन्हेसि दरब गरब जेहि होई । कीन्हेसि लोभ अघाइ न कोई ॥
कीन्हेसि जिअन सदा सब चहा । कीन्हेसि मीचु न कोई रहा ॥
कीन्हेसि सुख अउ कोड अनंदू । कीन्हेसि दुख चिंता अउ दंदू ॥
कीन्हेसि कोइ भिखारि कोइ धनी । कीन्हेसि संपति बिपति बहु घनी ॥

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[1] These encircle the seven regions (*dvīpas*) mentioned in I, 5. Their names, are Lavaṇa, Ikṣu, Surā, Ghṛita, Dadhi, Dugdha, Jala. The author, in stanza 141 gives a different enumeration, *viz.*, Khāra, Khīra, Dadhi, Jala, Sura, Udadhi, Kilakila.

[2] Mēru is the well-known mountain. It represents the northern hemisphere or pole, and is the abode of the Gods. Kukhaṇḍa is Kumēru, the southern hemisphere or pole, the region of the *daityas* or demons. The poet has mixed this up with Kishkindha, also to the south of Oude, and has confounded the two names.

[3] *Jari* is a root used for medicine, and *māri* is a root used for food.

[4] *Sāuja* is any animal used for food.

दो॥ कीन्हेसि कोइ निभरोसी   कीन्हेसि कोइ बरिआर।
छारहि तइँ सब कीन्हेसि   पुनि कीन्हेसि सब छार॥ ३॥

3. The order of these sets of *caupāīs* is different in different copies. The above is the order of Iab U K, Icd begin 4, 3, and then go on as above. Is begins 15, 16, and then 3, 4, &c., like Ia. 1. Icd *dihesi baḍāī;* Iac *tehi pāī*, Id *tehi khāī*, Is *tinha jāī*. 2. Ib *bahu sājū*, Ic *tehi sājū*. 3. Iac U K *bilāsū*, U K *kou* for *koi*. 4. Iacs U *jehi hōī*. 5. Id transposes ll. 5 and 6. Is *jīu sadā sukha*, U *jīyana sadā tinha*, K *jīwa sadā saba*, U *kōū*. 6. Id U *kōṭī*, Is *bahu dandū*; Id *dhandū*, U K *anandā*, *dandā*. 7. U *kou*, Ia *ati ghánī*, Id K *puni ghánī*, Is *sãga ghánī*, U *jū ghánī*. 8. U *kou* for *koi*. 9. Iacd *chārahi*, Is *tinha chāra*, K *bahuri kinha saba*.

3. He made man, and gave him dominion; He made grain for his food. He made the king who taketh pleasure in his kingdom, He made elephants and horses for his array. He made for him many delights. Some made He lords, and others slaves. Wealth made He from which cometh pride; He made longings which none can satisfy. He made life which all men ever desire; He made death, from which none can escape. Happiness made He and myriads of joys; sorrow made He, and care and doubt.[1] Some made He poor and others rich. He made frequent prosperity and adversity.

Some made He weak, and others strong. From ashes made He all, and again turned He all to ashes.

चौ॥ कीन्हेसि अगर कस्तुरी बेना। कीन्हेसि भीमसेनि अउ चेना॥
कीन्हेसि नाग मुखइ बिख बसा। कीन्हेसि मंत्र हरइ जो डसा॥
कीन्हेसि अमीँ जिअइ जेहि पाई। कीन्हेसि बिख जो मीचु तेहि खाई॥
कीन्हेसि ऊख मीठ रस भरी। कीन्हेसि करुइ बेलि बहु फरी॥
कीन्हेसि मधु लावइ लेइ माँखी। कीन्हेसि भवँर पंखि अउ पाँखी॥
कीन्हेसि लोवा उंदुर चाँटी। कीन्हेसि बहुत रहहिं खनि माँटी॥
कीन्हेसि राकस भूत परेता। कीन्हेसि भोकस देव दएता॥

दो॥ कीन्हेसि सहस अठारह   बरन बरन उपराजि।
भुगुति दीन्ह पुनि सब कहँ   सकल साजना साजि॥ ४॥

4. 1. Icds *bhīwasēnī*, U *bhīmasainiyā*. 2. P *mukha*, which spoils the metre. 3. Id makes this line the sixth, Is *amiya*, Ibd *jiuna jehi*, Ic *jiana jehi*, Ibd *tehi*, Iads U K *pāē*, *khāē*. 4. K *karui nīmi jō phárī*. 5. K *lāwai jo mākhī*, Icd K *bhawāra patãga*, Is *bhãwara nāga*. 6. Ia K *indura*, Icd doubtful, Ibs U clearly *undura*, Iacd *rahahī*. 7. So Iacd K, Ibs *kīnhasi rākasa dēwa daētā*, *kinhasi bhōkasa bhūta parētā*, U similar except . . . *dēwa dayantā*, . . . *bhūta parantā*. 9. Icd K *dihisa*, Ib U *sabahī*.

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[1] Two Urdū glosses translate *danda* by غم, grief, but the dictionary meaning of the word is enmity (*dwandwa*). Here it means opposition of ideas, doubt.

4. He made agallochum, musk, and the scented *khas* grass; He made the camphors,—*bhīmasēni*[1] and *cēna*.[2] He made the snake in whose mouth dwelleth poison; He made the snake-charm which carrieth off the bite. He made ambrosia, which giveth eternal life to him who getteth it; He made poison, which is death to him who eateth it. He made the sugarcane filled with sweet juice; He made the acrid creeper with its manifold fruit. He made the honey which the bee stores in its home; He made the humble bee, the birds and winged creatures. He made the fox, the rat and the ant; He made many creatures which dig the earth and dwell therein. He made demons, goblins and ghosts; He made ghouls and *Dēvas* and *Daityas*.

He made eighteen thousand creations of varied kinds. To all he gave a means of existence, and with every decoration did he deck them.

चौ॥ धनपति उहइ जेहि क संसारू। सबहि देइ निति घट न भँडारू॥
जावँत जगत हस्ति अउ चाँटा। सब कहँ भुगुति राति दिन बाँटा॥
ता करि दिष्टि सबहि उपराहीँ। मितर सतर कोइ बिसरइ नाहीँ॥
पंखी पतँग न बिसरइ कोई। परगट गुपुत जहाँ लगि होई॥
भोग भुगुति बहु भाँति उपाई। सबहि खिआवइ आपु न खाई॥
ता कर इहइ जो खाना पिअना। सब कहँ देइ भुगुति अउ जिअना॥
सबहि आस ता करि हर स्वाँसा। ओहि न काहु कइ आस निरासा॥
दो॥ जुग जुग देत घटा नहीँ उभइ हाथ तस कीन्ह।
अउर जो दीन्ह जगत महँ सो सब ता कर दीन्ह॥ ५॥

5. 1. Ias U *ohi*, K *dhanaita hai jehi kē san°*; Is U *kā̃*; P have *ka*; Iad *sabai*, J *nahi ghaṭai*. 3. K *sabhanha*, U *kou*. 4. Is puts verse 4 after verse 5, U *paragaṭi gupati*. 5. Ib *khawāwai*, U *āpuni khāī*, K *āpuna khāī*, P might also be read thus. 6. K *uhai*, Iads *sō khā°*, Ic *sabahi bhuguti dēī au jianā*; Is K *sabahi dēī*, U *saba kahā̃ dēhi*. 7. In *sabahi so tā kari hērai āsā* | *ohi na kāhu*, &c. Is *hari sā̃sā*, *ohī*, U *sabai*, *tā kara*, *sā̃sā*, *ohi na kāhu kī āsi*, K *sabhai āsa tā kari hari phērī* | *ohi nahi āsa ahai kehu kērī* || 8. Iac *ghaṭata*, U K *ghaṭai*, U *ubhai*, *tasi*. 9. Id *jo dēta*, U K *dēhi*, K *sabha tā kara*.

5. He indeed is a master of wealth, to whom belongeth the universe; to all He giveth continually, yet his storehouse minisheth not. To every creature in the world, from the elephant even to the ant, doth He day and night give its share of nourishment. His eye is upon all: none is forgotten, whether foe or friend; nor bird nor grasshopper, nor aught whether manifest or hidden is forgotten. He deviseth food and

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[1] The *Bhīmasēna-karpūra* of Sanskrit.

[2] The *Cīna-karpūra* of Sanskrit.

nourishment of many kinds. All doth He feed, yet eateth not himself. His meat and His drink is this—that to all He giveth nourishment and life. All have hope in him at every breath, nor hath He ever (turned) the hope of any to despair.

Æon after æon doth He give, yet never minisheth (his store). Yea, so doth He this with both hands, that whatever hath been given in this world, hath all been given by Him.

चौ ॥ आदि सोइ बरनउँ बड राजा । आदिहु अंत राज जेहि छाजा ॥
सदा सरबदा राज करेई । अउ जेहि चहइ राज तेहि देई ॥
छतर अछतरि निछतरहि छावा । दोसर नाहिँ जो सरिबरि पावा ॥
परबत ढाहि देखु सब लोगू । चाँटहि करइ हस्ति सरि जोगू ॥
बजरहि तिन कइ मारि उडाई । तिनहि बजर कर देइ बडाई ॥
काहुहि भोग भुगुति सुख सारा । काहू भीख भवन दुख मारा ॥
ता कर कीन्ह न जानइ कोई । करइ सोइ मन चित्त न होई ॥

दो ॥ सबइ नास्ति वह अस्थिर अइस साज जेहि केरि ।
एक साजइ अउ भाँजइ चहइ सँवारइ फेरि ॥ ६ ॥

6. 1. Id *ādi ēka baranaũ sō rājā ;* K *ādi anādi karata jehi chājā.* 2. Ibcd *karāī, dāī,* Iacs K *jehi, tehi.* Ibcd *achata,* Is *chatrahi achata nachatrahi,* U *nichatriya,* K *chatra nichatra nichatrihi ;* K *dūsara kōi na sarabari.* 4. Is *dēkha,* U K *dēkhu,* P give no clue, a third person singular seems required by the sense, Is *lōgā, jōgā,* Is *cīṭhihi,* Ib *karahi,* U *sãjōgū.* 5. Iac K *trina, trinahi,* U *uḍhāī, tinhai bajara kī dēhi baḍhāī,* K *tōri u(?a)ḍāī.* 6. *kāhū bhūkha bhīkha dukha,* Ia *bhīkha* (?) *bahuta,* U *dukha bhārā,* K *bhauna bhīkha dukha bhārā.* 7. Ibs K *karai so jō mana cinta na hōī,* Ia *karai so jō mana cintā hōī ;* K *karai sōi jō ohi mana hōī.* 8. U *asthirā* (which makes the metre right), Ias U *jehi,* K *tehi.* 9. U *aru bhãjai,* K *tehi bhã?.*

6. Let me tell of Him as that great primal king, who from the beginning to the end of things is worthy of his rule. Ever and for ever doth He rule, and whom He willeth, rule to him He giveth. Making umbrellaless him who hath the umbrella of royalty, He giveth it unto him who is without it ; no other is there who is equal unto Him. The people all look as He upturneth the mountains, and maketh the ant (that crawleth from beneath them) equal unto the elephant. Adamant He maketh like straw and scattereth it, and again He maketh straw like adamant, and giveth it honour. To one He giveth the food of enjoyment and all happiness, another striketh He with sorrow and a home (supported by) alms. No one understandeth what He hath done, for He doeth that which is beyond the power of mind and thought.

All else is non-existent[1]. He alone is ever the same, whose wondrous creations are such as these. He createth one and destroyeth him, and, if he will, he formeth him again.

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[1] Urdū gloss فاني, transient.

चौ॥ अलख अरूप अबरन सो करता। वह सब सउँ सब ओहि सउँ बरता ॥
परगट गुपुत सो सरब बिआपी। धरमी चीन्ह चीन्ह नहिँ पापी ॥
ना ओहि पूत न पिता न माता। ना ओहि कुटुँब न कोइ सँग-नाता ॥
जना न काहु न कोइ ओहि जना। जहँ लगि सब ता कर सिरजँना ॥
वेइ सब कीन्ह जहाँ लगि कोई। वह न कीन्ह काहू कर होई ॥
हुत पहिलइ अउ अब हइ सोई। पुनि सो रहइ रहइ नहिँ कोई ॥
अउर जो होइ सो बाउर अंधा। दिन दुइ चारि मरइ कइ धंधा ॥

दो॥ जो वेइ चहा सो कीन्हेसि करइ जो चाहइ कीन्ह।
बरजनहार न कोई सबहि चाहि जिउ दीन्ह ॥ ७ ॥

7. 1. Id reverses the order of ll. 1 and 2. U *baranaū̃ sō*, Ib *saba ohi saū̃ waha saba mahā̃ baratā*, K *oha saba sō̃ saba mō̃ waha baratā*, Is has *saū̃*. 2. Is K *jo saraba* U *paragaṭi guputi*, Ia *cīnha na cīnhata*, Id *cīnha na cīnhē*. 3. Ia *na ohi sā̃ga*, Id *na koī sā̃ghātā*, U *na koū sā̃ghātā*. 4. Ic *na koi wahi jānā*, Is *na waha koi jānā* U *na kou wē jānā*, K *ō kī sirajānā*. 5. Ias reverse order of ll. 5 and 6, K *waha saba*, Ib *wahu na kīnha*, Is *oha kīnha*, K *unha na kīnha*. 6. Ia *hutā so pahilahi sō hai sōī*, Is *au hai aba sōī*, K *hutā pahilahi aba hai sōī*, Ic *sō puni rahai rahai na na kōī*, U *sō puni*, K *rahai rahihi nahi kōī*. 7. Ia *auru jo hōhī*, U *aura kahai sō*, K *aura je rahai se bā°*, Ia *marahī kai*, K *marai kari*. 8. U *jō wai cāhasi kīnhasi*, K *jō oha cāha so kīnhasi*, Iak *karahī*, U *karahi ju cāhahi kīnha*. 9. U *na kāū*, Ic U *sabai cāhi*, K *sabhai, cahahi*, U *jiya*.

7. Invisible, formless and untellable is that Creator; He is one with[1] all, and all are one in Him. Whether manifest or hidden, He is all pervading. The righteous recognize Him, but not the sinful. He hath no son nor father nor mother, no family hath He, and no relations. He hath begotten none, nor is He begotten of any, but all created beings proceed from Him. All things, as many as exist, He made; nor was He made by any one. He was at the beginning, and He is now; He alone remaineth existent and no one else. All else that are, are mad and blind, for after but two or four days they do their work and die.

Whate'er He willed that He did, He doeth that He willeth to do. No one is there to prevent Him, and, by his mere will, He gave life to all.

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[1] The Urdū gloss translates *baratā* by نزدیک "near," but I know of no authority for this meaning. *Baratā* means *baṭā huā*, twisted as a rope is twisted, hence involved in, closely connected with. Compare *Bihārī Sat'saī*, 59, *diṭha barata bā̃dhī aṭani*, twisting their (mutual) glances into a rope, they bind it from balcony to balcony.

चौ॥ एहि बिधि चीन्हहु करहु गिआनू। अस पुरान महँ लिखा बखानू॥
जीउ नाहिँ पै जिअइ गोसाईं। कर नाहीँ पै करइ सवाईं॥
जीभ नाहिँ पै सब किछु बोला। तन नाहीँ जो डोलाओ सो डोला॥
स्रवन नाहिँ पै सब कछु सुना। हिआ नाहीँ गुननाँ सब गुना॥
नयन नाहिँ पै सब कछु देखा। कवन भाँति अस जाइ बिसेखा॥
नाँ कोइ होइ हइ ओहि के रूपा। ना ओहि अस कोइ अइस अनूपा॥
ना ओहि ठाउँ न ओहि बिनु ठाँऊँ। रूप रेख बिनु निरमल नाऊँ॥
दो॥ ना वह मिला न बेहरा अइस रहा भरि पूरि।
दिस्टिवंत कहँ नीअरे अंध मुरख कहँ दूरि॥ ८॥

8. 1. Id *cīnha jo*, K *cētahu*, Ib *purāna mẽ*, Is *giānā*, *bakhānā*. 2. Icds *jīu nāhī*, K *jīa nāhi* or *jia nāhī*, Ia *kara nāhī pai subahi karāhī*, Is *karai sawāī*, U *karahi samāī*, K *karai saharāī* (?). 3. Ia reverses the order of ll. 3 and 4, Ib *jo ḍolāwe so ḍōlā*, Id *jo ḍolāwahi ḍōlā*. 4. Ic reverses the order of ll. 4 and 5, Is has *sūnā*, *gūnā*, Ia U *hiyā nāhi*, Id *hiyā nāhi pai guna saba gúnā*, U *guninā*. 5. Ic U K *bhā̃ti so jāī*. 6. Ib *nā koi āhi na ohi kē rūpā*, Ic om. this line. Ias om. *hoi*, U *nā kou hai ohi*, K *na kōi hoi hai ohi*, Ia *nā kāhū asa rūpa anūpa*, Id *nā ohi kā asa taisa anūpā*, Is *na oha kāhu asa taisa sarūpā*, U *nā kōū asa taisa anūpā*, K *na oha kāhu asa rūpa anūpā*: possibly Ia fits in best with the rest of the passage. 7. K *na binu ohi ṭhā̃ū*, Ic *rūpa rēkha nahī*, K *niraguna nā̃ū*. 8. Ic K *nā hai milā na bichurā*, U *nā hai milā na waiharā*. 9. U *andhi murakhi kahā̃ dūri*, Ibd *mūrakhahī*.

8. In this manner know ye Him, and meditate upon Him, for so is the tale written in the holy book.[1] The Lord hath no life, and yet He liveth, He hath no hands, and yet He maketh all things. He hath no tongue, yet He telleth everything. He hath no bodily form, yet that which He shaketh, is shaken. Ears hath He not, yet heareth He all things; Heart hath He not, yet The Wise One discriminateth all things. He hath no eyes, yet all things doth He see; How can anyone discern as He doth? No one hath a form like unto His; nor, like Him, is any one so incomparable. He hath no abiding place, yet He is not without an abiding place. His form is without flaw, and His name is spotless.

He is not indiscrete, nor is He discrete, yet so doth He dwell (within us), and fill us (with himself). To those who can see, He is near, but is far from the foolish blind.

चौ॥ आउब जो दीन्हेसि रतन अमोला। ता कर मरम न जानइ भोला॥
दीन्हेसि रसना अउ रस-भोगू। दीन्हेसि दसन जो बिहँसइ जोगू॥

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[1] Urdū gloss for *purāna*, قرآن, the Qurān. This is quite possible. It will be seen that Mallik Muḥammad frequently uses Hindū words as Musalmān technical terms. E. G *cēlā*, 20, 4.

दीन्हेसि जग देखइ कहँ नयना। दीन्हेसि स्रवन सुनइ कहँ बयना॥
दीन्हेसि कंठ बोलि जेहि माहाँ। दीन्हेसि कर-पल्लउ बर बाहाँ॥
दीन्हेसि चरन अनूप चलाहीँ। सो पइ मरम जानु जेहि नाहीँ॥
जोबन मरम जानु पइ बूढा। मिला न तरुनापा जब ढूँढा॥
दुख कर मरम न जानइ राजा। दुखी जानु जा कहँ दुख बाजा॥

दो॥ कया क मरम जानु पइ रोगी भोगी रहइ निचिंत।
सब कर मरम गोसाइँ जानइ जो घट घट महँ निंत॥ ९॥

9. 1. Ic *puni jō dinhesi ratana amūlā*, Is *sabahi jo dinhesi*, U *dīnhasi*, K *jānahi*. Throughout, Is K have *dinhesi* and U *dinhasa*, cf. I. 2, n 2. Is *bihū̃si*, U *bihasē̃*, K *dasana bihasi mukha jōgū*, Iab *lōgū* for *jōgū*. 4. Iac U *jehi mā̃hā̃*, U *tihi mā̃hā̃* Ic reverses the order of ll. 4 and 5. 5. Iads *sōi jāna jehi dīnhesi nāhī̃*, K *sō pai marama janai jehi nāhī̃*. 6. Id *jāna hō*, Is *jāna hoi*, K *jōbana marama na jānai mūḍhā*, Ia *milā nāhi tarunāpā ḍhū̃ḍha*, Ic *saba ḍhū̃ḍha*, K *cahai na tarunāpā cāhai ḍhūḍhā* (sic), Is has *mūḍhē* and *ḍhū̃ḍhē*. 7. Id *sukha kara marama*, this makes better sense, and is also the reading of Rām Jasan, K *jehi kē dukha bā°*. 8. K *bhōgi rahai anacinta*. 9. Ib *saba kara marama jānu karatā*, K *ghaṭa raha ninta*.

9. And the simple-minded knoweth not the secret of the priceless jewels which He hath given. He hath given us a tongue, and the pleasure of taste; He hath given us teeth, which brighten[1] a smile. Eyes hath He given us to see the world; ears hath He given us with which to hear language. He hath given the throat in which dwelleth our speech. He hath given us fingers and noble arms. Feet hath He given us with which we gracefully walk. That man knoweth their secret who hath none. Yea, it is the old who know the secret of youth, when they find not their young days though they seek for them. The great man knoweth not the secret of poverty, but the poor man knoweth it, to whom poverty is come.

It is the sick man who knoweth the secret of the body, while the healthy man liveth careless; but the secrets of all are known to the Lord, who abideth ever in everybody.

चौ॥ अति अपार करता कर करना। बरनि न पारइ काहु बरना॥
सात सरग जउँ कागद करई। धरती सात समुँद मसि भरई॥
जावँत जगत साख बन-ढाँखा। जावँत केस रोवँ पँखि पाँखा॥
जावँत खेह रेह जहँ ताईँ। मेघ बूद अउ गगन तराईँ॥
सब लिखनी कइ लिखु संसारू। लिखि न जाइ गति समुँद अपारू॥
अइस कीन्ह सब गुन परगटा। अब-हुँ समुँद बूँद नहिँ घटा॥
अइस जानि मन गरब न होई। गरब करइ मन बाउर सोई॥

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[1] Lit., are fit for.

दो॥ बड गुनवन्त गोसाईँ चहइ सो होइ तेहि बेग ।
अउ अस गुनी सँवारइ जो गुन करइ अनेग ॥ १० ॥

10. 1. Ib *karatā kē karanā*, K *karatā kai karanī*, Iad *barani na kōī pāwai baranā* Ic *barani na pāru kāhu kai baranā*, Is *barani na koi jō pārai karanā*, U *barani na jāī āhi bahu baranā*, K *barani na kāhu parai jō baranī*. 2. Ib *saraga sāta*, Ia *sāta saraga kāgada jaũ ka°*, Ic *kāgada hūī*, Is K *jaũ kāgada*, Ic *hūī* for *bharai*, K *dharatī sāta saraga ma°*, U has *karahi*, *bharahi*. 3. Ic makes this line the sixth, Ib transposes ll. 3 and 4, Ib *rōma*, U *jāwāta kēsa rōma au pā̃khā*. 4. Ia *rēha khēha*, Icd U *khēha rēha duniyāī*, Ib *būna*, K *nakhata tarāī*. 5. U *likhai sansārā*, Ic *ati samū°*, Is *kabi amū°*, U *bidhi carita apārā*, K *kabi carita aparū* کب is evidently a misreading of گت. 6. Iacds *ēta guninha saba guna*, U *au saba guniyana guna paragāṭā*, K *aba guna para°*, Ib *tēhi samūda būdahi nahī ghāṭā*, Ia *bunda*, Id *aba-hu samūda mahā̃ bunda na ghāṭā* Is *aba-hu samūda tehi bunda na ghāṭā*, U *aba-hī būda samūda nahī ghāṭā*, K as in text, except *nīra* for *būda*. 7. K *garaba na ūṭhā*, K *garaba karai sō bāura jhūṭhā*. 8. Ib *bahu guna°*, U *asa guna°*, Iac *sō hoi tehi*, Ib *cahai sō tinha hō bēga*, U *sō hō tehi*, K *karai sō caha tehi bēga*, Rām Jasan *cahai sāwārai bēga*. 9 Id *jō guna karahi anēga*, Is *jō guna cahai*, U *karai na nēga*.

10. Very immeasurable are the makings of the Maker; no teller can tell them. If the whole universe took the seven heavens[1] for paper, and filled the seas[2] of the earth with ink. If it took as many branches as cover[3] all the forests in the world, and all the hairs and down (of animals), and all the feathers of birds. If it took the motes of dust and the like where'er it found them, and all the drops in the clouds and all the stars of heaven; and turned them all to pens and wrote, still then it could not write the shoreless ocean of his wondrous works. So hath He manifested all His skill, that even now not one drop of that ocean hath decreased. Think thou of this and let not pride be in thy heart. For mad is he, who, in his heart, nourisheth pride.

Very skilled is the Lord. What He willeth, for him that quickly is. And so skilfully doth He arrange (creation), that He displayeth countless kinds of skill.

चौ॥ कीन्हेसि पुरुख एक निरमरा । नाउँ मुहम्मद पूनिउँ करा ॥
प्रथम जोति बिधि तेहि कइ साजी । अउ तेहि प्रीति सिष्टि उपराजी ॥
दीपक लेसि जगत कहँ दीन्हा । भा निरमर जग मारग चीन्हा ॥
जउँ नहिं होत पुरुख उँजिआरा । सूझि न परत पंथ अँधिआरा ॥
दोसरे ठाउँ दई वेइ लिखे । भए धरमी जेइ पाढत सिखे ॥

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[1] The seven Heavens, see note to I, 5.

[2] The seven seas of Hindu tradition, see II, 1.

[3] *Bana-dhā̃khā*, is equivalent to *bana kē ḍhā̃khanē-wālē*, (branches) which cover the forest. The subject of all these verbs is *sansārā* in the fifth line.

ओइ नहिं लीन्ह जनम भरि नाऊँ। ता कहँ कीन्ह नरक महँ ठाऊँ॥
जगत बसीठ दई ओहि कीन्हा। दुऔँ जग तरा नाउँ ओइ लीन्हा॥

दो॥ गुन अवगुन बिधि पूछब होइहि लेख अउ जोख।
वह बिनउब आगइ होइ करब जगत कर मोख॥ ११॥

11. Ch. 1. Ia *nāu*, U K *nāma*; U K *niramdlā, kālā*; Id *pūnō* U *pūnou*, K *punīu* 2. Ia *unha kai*, Is *tinha kahā̃*, U *jōti tinha kī bidhi*, K *tā kara*, Is *tinha prīti*. 3. Inb U *dīpaka aisa*, U *bhā a(ā̃)jōra*. 4. Ibcd *jaū na hōta asa purukha ujyārā*. 5. Id *nāū*, U *ṭhāu daī* K *ṭhāwa daā*, Is *likhē ...... sikhē*, K *likhā ... sikhā*. Ia *paṛhatā*, K *bhau dharamī bhau paṇḍita sikhē*. 6. Is *jēi nahī*, Ia *ohi nāū*, K *janama bhara*. K *dīnha naraka mahā̃*. Icd transpose ll. 6 and 7. 7. Ia *ohi kīnhā*. Ibds U *kīnhē ... līnhē*. K *utima basīṭha dīnha oi kīnhā*, Ibs U K *dui*, Icd *dō*. Is U K *juga*; Id U K *tarai nāma*. Icd *ohi* instead of *jaī*, Is U K *unha*. 8. K *aiguna*, Ia *pūchihī*, U *hō kai*. 9. Iac *ohi*, Is U *unha*, Id *binawata*, K *unha āgē hama binaiba*; Id *karata*.

11. He made one man without a blemish, named Muḥammad glorious as the full moon. It was his radiancy that God first produced, and then for love of him He created the universe. He kindled that light and gave it to the world. The world became clear, and recognized its (true) way. If that bright man had not been, the dark path would not have been visible. The deity wrote the second place for him,[1] and that man became just who learned his creed.[2] For him, who hath not taken (refuge in) his name throughout his life, God hath prepared a place in hell. The deity made him His messenger to the world, and whoever hath taken his name passes safely across both worlds.[3]

God will ask of each his virtues and his vices, (when) there will be the (great) casting up of accounts. But he (Muḥammad) will humbly bend before him, and will effect the salvation of the world.

चौ॥ चारि मीत जो मुहमद ठाऊँ। चहुँ क दुऔँ जग निरमर नाऊँ॥
अबा बकर सिद्दीक सयाने। पहिलइ सिदिक दीन वेइ आने॥
पुनि सो उमर खिताब सोहाए। भा जग अदल दीन जो आए॥
पुनि उसमान पँडित बड गुनी। लिखा पुरान जो आयत सुनी॥
चउथइ अली सिंघ बरिआरू। चढइ तो काँपइ सरग पतारू॥

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[1] That is to say, he was second of all things, God being the first; other created beings followed. Paṇḍit Sudhākara Dvivēdī translates this verse, 'Those men became just who learned his teaching, and that God, (*i. e.*, Muḥammad) wrote his name in the second place, (*i. e.*, heaven); but for them, who throughout their lives did not take his name, (*i. e.*, adopt his teaching), he fixed a place in hell.

[2] *Lit.*, teaching. The Urdu gloss gives كلمه, the Musalmān creed.

[3] The *ihalōka* and *paralōka* of the Hindūs. This world and the world to come.

चारि-उ एक मतइ एक बातीं । एक पंथ अउ एक सँघाता ॥
बचन एक जो सुनावहिँ साँचा । भा परवाँन दुहूँ जग बाँचा ॥

दो॰॥ जो पुरान विधि पठवा सोई पढत गरंथ ।
अउरु जो भूले आवतहि तेहि सुनि लागहिँ पंथ ॥ १२ ॥

12. 1. Ia *cahū̃ dīnha*, Icd *cahū̃ kā duhū̃*. 2. Ia *taba ānē*, Ic *wei ānē*, Is *sidika daiya unha mānē*, K *uni ānē*, U *dīna oi jānē*. 3. Ibc U *puni jō*, Id *puni tehi*, Ia *jaba āē*, Ib *ohi āē*, Is *jāū̃ āē*, K *jinha jaga adala dīna kahā̃ lāē*. 4. Ib *bahu gúnī*, Id *baḍa paṇḍita gúnī*, U *puni usi mahā baḍa paṇḍita*. Ia U K *likhā kurāna*. The correction is evidently a scribe's improvement. 5. Ia *bariārā*, K *bala tē kā̃pai*. Ias *saũhi na kōū rahā jujhārā* (Is° *rū*). 7. K *paramāna*. 8. K. *Kurāna* for *purāna*, ... *sōi likhā kari grantha*. 9. Is *tē saha*, K *tē suṭhi*.

12. Muḥammad had four friends, who (followed him) in his place, and the four had spotless names in both worlds. Abū Bakr Çiddīq, the wise, who first truthfully (*çidq*) brought the faith (into the world).[1] Then 'Umar, who adorned the title (of Caliph). Justice came to the world when he adopted the faith. Then 'Uṣmān, the learned and wise one, who wrote the *Qurān*, as he heard its verses. Fourth came 'Alī, the mighty lion. When he attacked, both heaven and hell quaked. All four had one mind, and one word, one path and one fellowship. Each preached the same true word, which became authoritative, and read in both worlds.

The very *Qurān*[2] which God[3] sent down (to this world), that holy book they read, and they who (have lost their way) in coming (into the world), when they hear it, find the path.[4]

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[1] Lit., brought.

[2] Here again we have *purāna* used for the Musalmān sacred book.

[3] Here *vidhi*, a Hindu technical term.

[4] Abū Bakr ibn Abī Quḥāfa was Muḥammad's dearest friend and father-in-law, and one of his first converts. He enjoyed immense influence with his fellow citizens of Mecca, and earned by his probity the appellation of 'al Çiddīq,' 'The True.' He accompanied Muḥammad in the Flight, and on his death (632 A. D.) he became the first Caliph. He died 634 A. D.

'Umar ibn Al Khaṭṭab was converted in the 6th year of the call (615 A. D.). His conversion carried with it so much weight that the Musalmān traditions relate it with miraculous attendant details. Abū Bakr by his eloquence and address, and 'Umar by his vigour and promptitude, supplied the want of the practical element in Muḥammad's character. 'Umar set the example of public (instead of private) prayer, which was followed by other Muslims. He was the leading spirit of the Emigrants (*muhājira*) who had left Mecca at the time of the Flight, and settled in Medina. He procured the nomination of Abū Bakr to be first Caliph, and, as a matter of course, succeeded him as second Caliph in 634. He was murdered at Medina in 644.

चौ॥ सेर साहि देहिली सुलतानू। चारि-उ खंड तपइ जस भानू॥
ओही छाज राज अउ पाटू। सब राजइ भुइँ धरा लिलाटू॥
जाति सूर अउ खाँडइ सूरा। अउ बुधिवंत सबइ गुन पूरा॥
सूर-नवाई नवौ खंड भई। सात-उ दीप दुनी सब नई॥
जहँ लगि राज खरग बर लीन्हा। इसकंदर जुलकरन जो कीन्हा॥
हाथ सुलेमाँ केरि अँगूठी। जग कहँ जिअन दीन्ह तेहि मूठी॥
अउ अति गरू पुहुमि-पति भारी। टेकि पुहुमि सब सिस्टि सँभारी॥
दो॥ दीन्ह असीस मुहम्मद करउ जुगहि जुग राज।
पातिसाहि तुम्ह जगत के जग तुम्हार मुहताज॥ १२॥

13. 1. U *sēra sāha*, K *sēra sāha*, U *sulatānā ...... bhānā.* Ia *cārihi*, Ic *cāri-u*, Is K *jaça.* 2. Ib transposes ll. 1 and 2. Ib *ohi kahā̃ chāja chatara au pāṭā*, Is *chāja chālā au*, U *ōhī chātra sāju au*, K *ohi pai chāja chatra au*, Ia J K *pāṭā......lilāṭā.* Ib *rajai*, Ic *sabha rājā*, Id *sabha* (or *sabahi*) *rājanha (or rājahi).* Is K *saba rājanha*, U *saba rājānu* (?); 3. Ia K *gunawanta*, Icd *sabahi*, Ib *bidhi pūrā*, Is *nidhi pūrā.* 4. Is *nawāi nawa khā̃ḍahu*, K *nāwa nau khā̃ḍahi.* The final word of the half line بهي, may be transcribed either *bhaī* or *bhaē.* All N give the former, but printed editions give the latter. So also ني may be either *naī* or *naē.* I prefer *bhaī* and *naī* as giving the best sense. Iad *sātahi.* U *dīpa duniā*, Is *dīpa duniā sira.* 6. Ibds *tahā̃ lagi.* Ia *kharaga bala*, Icds *kh° para;* Ia *jala karana na kīnhā* (چل‌کرن نکينهان), Ib جولكرن Ic ذوالقران Id ذوالقران U *julikandhara kīnhā.* 6. Ib *dēwa jabahi bhara mūṭhī* U *juga kahā̃ jīwa dīnha*, K *jaga kahā jīti līnha gahi mūṭhī.* Ia *puhumi bhāra saba līnha samhārī* | *ōhī sakai puhumipati bhārī* || K *puhumi bhāra ohi ēka sā̃bhārā* | *tau thira rahai sakala sansārā* || 9. Ia *pādashāha*, Ic *bādashāha*, K *tuha jaga para jaga tohāra.*

13. Shēr Shāh is Sultan of Delhi, who warmeth the whole world[1]

'Uṣmān ibn Affān was one of Muḥammad's first converts, and married his daughter. He was elected third Caliph on the death of 'Umar. The Qurān was compiled in its present form in his reign. He was killed at the age of eighty in 656, in the rebellion which arose in consequence of the movement, the ultimate aim of which was the deposition of 'Uṣmān in favour of 'Alī.

'Alī ibn Abū Ṭālib was Muḥammad's cousin, and one of his first converts. He followed him to Medina three days after the Flight. He succeeded 'Uṣmān as fourth Caliph in 656, and was murdered in 661 A. D.

The first compilation of the Qurān was undertaken by Zāid ibn Ṣābit, who was appointed to the work by the Caliph Abū Bakr at the instigation of 'Umar. Zāid had been an amanuensis of Muḥammad. This redaction had no canonical authority, and discrepancies in the text soon appeared. Accordingly, about 659 'Uṣman confided to Zāid and three other Quraishites the preparation of an edition which was to be canonical for all Muslims. This text was completed in 660, and is the one which is now extant.

[1] Lit., the four quarters. The use of *khaṇḍa* is uncommon, but it is the only meaning which I can suggest here. An Urdū gloss gives چارون طرف.

like the sun. His kingdom and throne beseem him well; low on the earth have all kings laid their brows before him. By caste a Sūr[1] and with his sword a hero; wise is he and full of all skilfulness. In the nine regions the sun (or all heroes) hath set (or bent low) before him,[2] and the seven continents[3] of the world all bowed before him. All his kingdom he won with the might of his sword, as did Alexander, the Ẕū'l Qarnain.[4] On his hand is Solomon's ring, and, with it, he gave gifts to the world with full hand. Majestic is he, and a mighty lord of the earth; like a pillar he supporteth the earth and maintaineth the whole universe.

Muḥammad blessed him and said, reign thou from age to age. Thou art the Emperor of the World. The world is a beggar at thy door.

चौ॥ बरनउँ सूर पुहुमि-पति राजा। पुहुमि न भार सहइ जेहि साजा॥
हय-गय सेन चलइ जग पूरी। परबत टूटि उडहिँ होइ धूरी॥
रइनि रेनु होइ रबिहि गरासा। मानुस पंखि लेहिँ फिरि बासा॥
भुइँ उडि अँतरिख गइ खित मंडा। खँड खँड धरति बिरिछ ब्रहमंडा॥

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[1] Here, and in the following stanzas there is a series of puns on the word *sūra*, which is not only the name of the Afghān tribe to which Shēr Shāh belonged, but also means a hero, and the sun.

[2] *Lit.* 'In the nine regions there was a bending of *sūra*,' where, again, there is a pun on the word *sūra*, 'hero' or 'sun.' According to the most ancient Hindū Geographers, India was shaped like an eight-petalled lotus. These eight petals, together with the central division, formed the nine *khaṇḍas* or regions, *viz.*, Pañcāla (central), Kaliṅga (S. E.), Avanti (S.), Ānarta (S. W.), Sindhu-Sauvira (W.), Hāra-haura (N. W.), Madra (N.), Kauṇinda (N. E.). The Purāṇas give a different list of names, *viz.*, Indra (E.), Kasērumat (N.), Tāmraparṇa, (? S.), Gabhastimat, Kumārikā (Central), Nāga, Saumya, Vāruṇa (W.), Gāndharva. See Cunningham's *Ancient Geography of India*, pp. 5 and 66.

[3] See I, 5.

[4] Ẕū'l Qarnain, means 'The Master of Two Horns.' Muṣalmān tradition varies about this name. According to some, the Ẕū'l Qarnain was not Alexander the Great, but another saint, who lived at the time of Khāja Khiẓr, and who was so called from his having two curls hanging, one from each side of his forehead, or because he reached both sides of the world, or because he was noble by descent from both his parents, or because he went through both the light and dark parts of the world, or because he died when struck on one side of the forehead, and then was restored to life, and again died on being struck on the other side of the forehead, and again came to life.

Beale's *Oriental Biographical Dictionary*, (Ed Keene), says 'Master of Two Horns, a title of Alexander the Great, probably based on coins representing him in the character of Ammon.' Dr. Hoernle informs me that Alexander's coins show his head adorned with two ram's horns. They were widely current in the East, and the Muḥammadans probably gave him that name after his coins.

डोलइ गगन इँदर डरि काँपा । बासुकि जाइ पतारहि चाँपा ॥
मेरु धसमसइ समुँद सुखाहीँ । बनखँड टूटि खेह मिलि जाहीँ ॥
अगिलहि काहु पानि खर बाँटा । पछिलहि काहु न काँदउँ आँटा ॥

दो ॥ जो गढ नएउ नहिँ काहुही चलत होहिँ सब चूर ।
जब-हि चढइ पुहुमी-पति सेर साहि जग-सूर ॥ १४ ॥

14. 1. Id *sō sājā.* 2. Ia *hai kī rēnu,* Is *hai gai saina.* U *hai maimanti calai.* Ia *parabata phūṭi hōi sama dhūrī.* Ib *uṭhahī hoi,* Is *parabata phūṭi,* K *ṭūṭi jhikaṭi.* 3. Ia *sūra rainu hoi dinahi garāsā.* Ib *parahi rainu,* Is K *raini rēnu,* Id omits this line. 3. K *pañchhi.* 4. Iac U K *ūpara hoi chāwai brahamaṇḍā.* Ia *ḍōlai dharatī au brahamaṇḍā,* U *nawa khāḍi dharati sakala brahamaṇḍā,* K *khaṇḍai dharatī bhau sata khaṇḍā.* 5. Ia transposes this and the next line. U *patālahi jhā̃pā,* Iac K *patārahi jhā̃pa.* 6. Is *bhai jāhī.* 7. U *ghara bā̃ṭā.* K *kharha kā̃ṭā.* Ia *pāchai parā sō kā̃daū,* Id *kahā̃ nahī,* K *kahā̃ kādau nahī ā̃ṭā.* 8. Ia *giri tariwara kahū̃ na rahā calata hōta saba cūra.* Id *hōhi sō cūra.* Is *saina calata giri tariwara hōhī sabai sata cūra.* U *jo gaḍha naai na nāai calata hōhi tē cūra.* K *jo giri tarai na kāhu tē calata hōi sabha cūra.* 9. Ias U K *jaba-hī.* Ia *calai.*

14. I tell of the heroism of this king, Lord of the world, the weight of whose array is greater than the world can bear. When his army full of horsemen advanceth, covering the earth, mountains crash and fly away in powder, night cometh from the clouds of dust which eclipse the sun, so that man and bird alike goeth home to bed. The land taketh flight, and goeth up into the firmament; earth-dust adorneth each continent,—yea the world, the whole creation and the universe.[1] The Heavens tremble, and Indra quaketh in fear; the snake-god Vāsuki fleeth and hideth himself in the lowest Hell.[2] Meru becometh a quagmire, the oceans dry up, and the forests break and are mingled with the dust. (When his army marcheth to a halting place) some of his advance guard may receive a share of water and of grass, but for none of his rear guard is there even sufficient mud.

Citadels which have never bowed to anyone, when he advanceth all become dust,—when the Lord of the World, Shēr Shāh, the Sun of the Universe attacketh them.

चौ ॥ अदल कहउँ पुहुमी जस होई । चाँटहि चलत न दुखवइ कोई ॥
नउसेरवाँ जो आदिल कहा । साहि अदल सरि सोउ न अहा ॥
अदल कीन्ह उमर कइ नाईँ । भइ आहा सगरी दुनिआईँ ॥

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[1] The √ *maṇḍ* has two meanings, either 'to adorn' (*maṇḍana*) or 'to crush,' (*mardana*). The passage here is corrupt in all MSS., and the reading is very doubtful.

[2] See note to line 5 of the first stanza.

परी नाँथ कोइ छुअइ न पारा। मारग मानुस सोन उछारा॥
गोरु सिंघ रेंगहिं एक बाटा। दून-उ पानि पिअहिं एक घाटा॥
नीर खीर छानइ दरबारा। दूध पानि सब करइ निनारा॥
धरम निआउ चलइ सत भाखा। दूबर बरी एक सम राखा॥
दो॥ पुहुमी सबइ असीसई जोरि जोरि कइ हाँथ।
गाँग जउँन जल जब लगी तब लगि अमर सो माँथ॥ १५॥

15. In Is this is No. 3. Ch. 1. Iabs *jasa prithimī hōī.* J *jasu.* K *kasa hōī.* Icd *cā̃ṭā.* Is *cī̃ṭā,* K *bāṭa calata dukhawai nahī̃ kōī.* 2. U *ādila āhā,* K *ādila kāhā.* Ib *sama sōu.* U *sō uni rāhā.* K *sari jūja na tāhā.* 3. Iab *adala jo kinha umara.* Iab *bhaī āni,* U *sigarī,* K *kiriānā puhumī jahā̃ tā̃ī.* 4. U *kou.* Ib *sūna.* Icd *mānusa saū ujiārā.* 5. Is U *gāi siṅgha* K *gāe sēra.* Is *dua-u (? dūa-u) pāni,* U *dōnō.* K *dunau pāni pi°.* Ia *chīra,* Ib K *chānahī̃,* Is *chānī.* Ia *hōi ninārā,* Ibcd *karai nirārā.* K *pāni sō karahi ninārā.* 7. Ib *barihi,* Ic *wahā̃ sama,* Id *balī dū-hī sama.* Is *dubare baria dua-u,* U *baria ēka,* K *dūbara balī ēka.* 8. Icd *saba prithimī āsīsaī,* Is *sabai prithimī asīsaī,* U *saba prathimī mili asīsai,* K *sabhai prathimī asīsa dēi.* Ia *lāi lāi bhūi mātha,* Ic *dui hātha* Id *kara hātha* U *jōra jōra dou hātha.* 9. Ia *gā̃ga jamuna,* Ibd *gaṅgana jamuna,* Ics *gā̃ga jauna jau lahi jala.* U *gaṅga jamuni jala jau lahi,* K *gaṅgā jauna jau lagi jala.* Ib *ammara nātha,* Is J *ammara mātha.* U *tau lagi,* Id *amara to mātha.*

15. I tell of his justice,[1] how it is upon the earth. Not even to a crawling ant doth anyone (dare to) give pain. Naushērwān[2] was called 'The Just,' but even he was not equal to the justice of Shēr Shāh. He did justice like unto 'Umar,[3] for the cry for justice to him was (spread over) the whole world. No one dareth even to touch a nose-ring lying fallen on the ground, (much less to pick it up and appropriate it). On the very highways do men sweep up gold. The cow[4] and the tiger walk together on the same road, and both drink water together at the same landing-ford. He straineth milk and water (mixed together) in his court, and separateth the one from the other. Sincerity marcheth with piety and justice, and the weak and the mighty he keepeth on even terms.

The whole earth blesseth him, folding its hands continually, and crying, may that head endure immortal as long as there is water in the Ganges and the Jamunā.

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[1] This reference to Shēr Shāh's justice (*'adal*) may have a complimentary reference to his son 'Adal. See *J. A. S. B.*, Pt. I, 1890, p. 167.

[2] The celebrated king of Persia, surnamed 'Ādil, or the Just. He ascended the throne 531 A. D. He was the Chosroes of the Greeks. Muḥammad (B. 571) used to boast of his good fortune in being born when so just a king reigned. He died 579 A. D.

[3] The second Caliph in succession to Muḥammad. See note to 12, 9.

[4] *Gōru* is properly any domesticated herbivorous animal.

चौ॥ पुनि रुपवंत बखानउँ काहा। जावँत जगत सबइ मुख चाहा॥
ससि चउदसि जो दइ सँवारा। तेहु चाहि रुप उँजिआरा॥
पाप जाइ जउँ दरसन दीसा। जग जुहारि कइ देइ असीसा॥
अइस भानु जग ऊपर तपा। सबइ रूप ओहि आगइ छपा॥
अस भा सूर पुरुख निरमरा। सूर चाहि दस आगरि करा॥
सउँह दिस्टि कइ हेरि न जाई। जेइ देखा सो रहा सिर नाई॥
रूप सवाइ दिन दिन चढा। बिधि सुरूप जग ऊपर गढा॥

दो॥ रुपवंत मनि माँथइ चाँद घाट ओहि बाढि।
मेदिनि दरस लोभानी असतुति बिनवइ ठाढि॥ १६॥

16. In Is this is No. 4. 1. Ib *kāhā*, *cāhā*. Id *sabahi*. K *muha*. 2. U *caudasi cāda dai sāwārā*. Iabc U *daī*, Is *daiya*. U K *tā hū*. Ic *cāhi adhika ūji°*. 3. K *jāi pāpa*. Is *pāpa ghaṭai jaū*, U K *jō*, P *jō or jau*. U *jagata juhārai dēi*. 4. Ic K *sabhai*. 5 Icd *purukha sūra niramārā*. Is *bhā asa sūra pu°*. U *asi bhaye sūra purakhi naramālā* (sic). K *asa ohi sūra nāwa niramālā*. Ibc *daha*. U *kālā*. K *ohi āgari kālā*. 6. U *hēru*. Ia *jaī jaī dēkha rahai*, Ib *jō dēkhai so rahai*, U *jō dēkhā so rahā lubhāī*, K *jō dēkhai sō raha sharamāī*. 7. Ic *saba ūpara*. Ib *surūpa*. Other Ps doubtful, N *sarūpa*. Is *darapawanta*. 9. Is K *mēdani darasa lobhānī*. U *mēdina darasi lu°*.

16. Again, how can I describe his comeliness, for all the world desireth the beauty of his countenance. His comeliness surpasseth in brightness even the full moon which God created. Sin abandoneth those who reverently gaze upon him, and the whole world maketh obeisance and blesseth him. As when the sun blazeth over the world, so, before him, all things hide their comeliness (in shame.) Thus did the sun[1] become a spotless man, with ten times more[2] beauty than the sun itself. No one can look upon him face to face, and if anyone see him, he remaineth with bent head. His comeliness increaseth by a quarter, day by day, for the Creator formed his beauty above the world.

Comely is he with a jewelled (tiara) on his brow, and the moon waneth as he waxeth; while the earth, craving to see him, standeth and humbly offereth its praises.

चौ॥ पुनि दातार दइ बड कीन्हा। अस जग दान न काहु दीन्हा॥
बलि बिकरम दानी बड अहे। हातिम करन तिआगी कहे॥
सेर साहि सरि पूज न कोऊ। समुँद सुमेरु घटहिँ निति दोऊ॥
दान डाँक बाजइ दरबारा। कीरति गई समुँद-ही पारा॥

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[1] Here again the word *sūra* is introduced with a threefold meaning, hero, sun and proper name.

[2] *Āgari* means 'more than.' Cf. 381, 2, and 454, 8.

कंचन परसि सूर जग भएऊ। दारिद भागि दिसंतर गएऊ॥
जउँ कोइ जाइ एक बेरि माँगा। जनम-हु भएउ न भूँखा नाँगा॥
दस असमेध जग्य जेइ कीन्हा। दान पुन्न सरि सौ-उ न दीन्हा॥

दो॥ अइस दानि जग उपजा सेर साहि सुलतान।
ना अस भएउ न होइही ना कोइ देइ अस दान॥ १७॥

17. Here Is resumes the correct numbering. 1. Iabc U *daī*, Is *daiso*, U *daā*. U *baḍi*, *asi*, *dā̃ni*. 2. Icd K transpose *dhē* and *kāhē*. Icd U *Bali au Bikrama dāni*, K *Bali au Kārna dātā baḍa*. Is *Hētama*, *U Hōtama*, K *Hētima*. 3. U *sara-pūji*, Is K *ghaṭai*. U *sumēru bhā̃ḍāri dōū*. 4. Is *ḍāka dāna*. U *dāna ḍaṅka*. Ia *samūda kai*, Ib U *samundara pārā*. 5. U *kañcana barasi sūra kali*. K *kañcana barisa sūra kali*. 6. Ia *bāra eka mā̃gā*. Other P بِر *bira* or *biri*. Iac *janama na hūī bhūkha au nā̃gā*. U *janama hōi nahi bhūkhā nā̃gā*. 7. Ibcs *jō kīnhā*. U K *dasi asimēda jagya jō*. Ia *tinha-hū surasari dāna na dīnhā*. Ib *dāna punna sari tāhu na dīnhā*. Id *sari saũhi*. Is *sē-u na*, U *sō uni cīnhā*. K *unha sabha kē dīnhā*. 8. U K *jaga ūpara*. 9. U *kou dai asi*.

17. Again God hath made him so greatly generous, that none in the world hath ever given gifts like unto him. Bali[1] and Vikramāditya[2] were famed for their generosity, and Ḥātim Ṭāē[3] and Karṇa[4] were described as lavish; but none of them equalleth Shēr Shāh, for the very ocean and even Mount Mēru, are ever minishing (as they give up their jewels and gold). The kettle-drum of his generosity soundeth at his court, and the fame thereof hath gone even across the ocean. The world touched this Sun,[5] and became of gold compact, so that poverty fled and went beyond the borders of his kingdom. He who but once approacheth him and asketh, for all his life is free from hunger and from nakedness. Even that (King of old) who performed ten horse-sacrifice,—even he gave not holy gifts like him.

So generous hath Sultan Shēr Shāh been born upon the world, that none hath e'er been like him, or will be, nor doth anyone give such gifts.

चौ॥ सइयद असरफ पीर पिआरा। तेंइ मोहि पंथ दीन्ह उँजिआरा॥
लेसा हिअइ पेम कर दीआ। उठी जोति भा निरमर हीआ॥

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[1] The well-known Daitya, who gave Viṣṇu his famous three paces of ground.

[2] "Clarum et venerabile nomen."

[3] Familiar to readers of the Bāgh-o-Bahār (story of the second Darwēsh.)

[4] The famous Hero of the Mahābhārata. The son of Kuntī by Sūrya. He was more famous for his chivalry than for his generosity.

[5] Again the triple pun on the word *sūra*. Shēr Shāh is compared to a philosopher's stone which changed all that touched it into gold.

मारग हुता अँधेर असूझा । भा अँजोर सब जाना बूझा ॥
खार समुँदर पाप मोर मेला । बोहित धरम लीन्ह कइ चेला ॥
उन्ह मोर करिआ पोढि कइ गहा । पाएउँ तीर घाट जो अहा ॥
जा कहँ ओइ अइस कनहारा । ता कहँ गहि लेइ लावहि पारा ॥
दस्तगीर गाढे के साथी । जहँ अउगाह देहिं तहँ हाथी ॥
दो॥ जहाँगीर ओहि चिस्ती निहकलंक जस चाँद ।
वेइ मखदूम जगत के हउँ उन्ह के घर बाँद ॥ १८ ॥

18. 1. Ia *jehi (or jinha) mohi*, Is *tinha mohi*, U *tē*. P (exc. Ia) *tinha* or *tehī*. 2. Ia *lēsē-hī eka pēma*. Ibd U K *prēma*, Is *pirama* (sic). Ib *wahī jōti*, U *ōhi jōta*, Id *bhai sō jōti bhā*, Ic *bhai niramala*, K *bhau niramala*. 3. Ib *huta ā̃dhēra sō sūjhā*, Ic *huta jo ā̃dhēra asūjhā*, Id illegible, Is *māraga hato ā̃dhiāra so sūjhā*, so U but *ā̃dhēra*, K *māraga andha hōta sō sūjhā*. Ib *bhā ū̃jēra*, Ic U *jaga jānā̃*, Id *parā sūjha saba jānā*. 4. K *rākhu kai*. 5. N *unhi*, P *ohi* or *unha*. Ia كريتي, Ic *karī*, Id *ohi kara mōra pō°*. Is *pōha kai*, U *paudhi kai* K *unha mori kairihara* (?) *paudhi kai gāhī* …… *ghāṭa jahā̃ rāhī*. Ia *jahā̃ āhā*, U *ghāṭi*. 6. Ib *jā kē*, Ic *jā kara aisa hōhi*, Id U K *jā kara hōhi aisa*, Ia *gahī bēga lei lāwai pārā*, Ib K *turita bēgi sō utarai*, Is *turita bēgi so pāwai*. U *turita ēi lai lāwai*. 8. Is *oi cistī*, K *rūpa jai se jaga cā̃da*. K *oi ati baḍē jagata mahā̃*. Ic *hama unha*. Ic *unha kara*.

18. Saiyad Ashraf (Jahāngīr)[1] was an elect saint, and he it was who threw light upon my path. He lit the lamp of love within my heart; the light burned up, and my heart became pure. My way had been dark and invisible, and lo! it became bright and I understood. He cast my sins into the salt ocean, and making me as his disciple took me into the boat of virtue. He grasped my rudder firmly,[2] and I reached the landing place on the far bank. If a man hath such a steersman,[3] he graspeth him and bringeth to the other side. He is a protector, and one who succoureth in time of trouble, and, where (the water) is fathomless, there giveth he his hand.

His family title was Jahāngīr, pure like the moon. He was the Holy Master of the World, and I am the slave of his house.

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[1] Saiyad Ashraf was one of the founders of the line of spiritual preceptors, whose representative in the first half of the 16th century (Muḥiu'd-dīn) taught the poet. For full particulars see note to stanza 20.

[2] This is a difficult passage. *Kariā* is the same as *kaḍī*, an iron ring, or a beam, hence a rudder. Either meaning will do here. Other MSS., and printed editions have *unha mora kara būḍata kai gāhā*, he grasped my hand as I was sinking. *Pōḍhi kai* means 'firmly.'

[3] *Kanahāra* or *kanadhāra* is the Sanskrit *karṇadhāra*.

चौ॥ तेहि घर रतन एक निरमरा। हाजी सेख सुभागइ भरा॥
तेहि घर दुइ दीपक उँजिआरे। पंथ देइ कहँ दइ सँवारे॥
सेख मुबारक पूनिउँ करा। सेख कमाल जगत निरमरा॥
दुअ-उ अचल धुव डोलहिं नाहीँ। मेरु खिखिन्द तिन्ह-ऊ उपराहीँ॥
दीन्ह रूप अउ जोति गोसाईँ। कीन्ह खंभ दुऊँ जग कइ ताईँ॥
दुऊँ खंभ टेकी सब मही। दुऊँ कै भार सिस्टि थिर रही॥
जो दरसइ अउ परसइ पायाँ। पाप हरा निरमर भइ कायाँ॥

दो॥ मुहमद तहाँ निचिंत पँथ जेहि सँग मुरसिद पीर।
जेहि रे नाउ अउ खेवक बेगि पाउ सो तीर॥ १९॥

19. 1. Id *ohi* or *unha*. Is U *unha*, K *tinha*, U K *niramálā*, *bhálā*. Iad شيخ Ibc سیکھ. Ib *so bhāgai*, Ic *sabhā guna*, U *sabai guna*, K *sabhāgā*. Is U *tinha ghara*. K *tinha kē ghara dui dīpa*, Ic *ūjiārā*, *sãwārā*. Is *daiya sã°*. K *daā sã°*. 3. Iad شيخ Ibc سیکھ, U *sēkha muhammada*, Ia U K *kálā*, *niramálā*. 4. Is *khaṇḍa khaṇḍa*. U *khakhaṇḍa tāhu*, K *khikhida tāhī*. 5. Is *khãbha*, U *jaga ki nāī*. 6. Ia *ṭēkā*, Is *ṭēkū taba*. U *duhū kē bhāra sristi thira ráhī* | *dōna-hū kara ṭēkī saba máhī*, K *tau tehi bhāra jagata thira*. 7. Is *jinha darasyau au parasyau*, K *jinha darasā parasā unha pāyā*. Is *bhau*, K *bhā*. 8. K *nicinta rahu*. 9. All copies insert *kariā* before *khēwaka*, except U *jehi rē nāwa hai kariyā*, and K *jehi rē nāwa kariyāā*. The omission of either *kariā* or *khēwaka* is required by the metre, but, except U and K, all copies have both. K *bēgi sō lāwai tīra*.

19. In his house was a spotless jewel, Ḥājī Shēkh by name, full-filled with good fortune. In his house were two bright lights, whom God created to show the way. Shēkh Mubārak glorious as a fullmoon, and Shēkh Kamāl spotless in the world. Both were stedfast, unmoveable like pole-stars, exalted even above Mēru and Kukhaṇḍa.[1] God gave them beauty and glory, and made them pillars of the world. On these two pillars supported He the earth, and under their weight the universe remained firm. Whoever saw them and reverently touched their feet, his sins were lost and his body became pure.

O Muḥammad, there is the road secure, where a saintly teacher beareth company. When he hath a boat and a rower, a man quickly gaineth the other side.

चौ॥ गुरु मोहिदी खेवक मइँ सेवा। चलइ उताइल जेहि कर खेवा॥
अगुआ भयउ सेख बुरहानू। पंथ लाइ जेहि दीन्ह गिआन॥
अलहदाद भल तेहि कर गुरू। दीन दुनी रोसन सुरखु-रू॥
सइयद मुहमद कै वेइ चेला। सिद्ध पुरुख संगम जेइ खेला॥

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[1] See line 1 of the second stanza.

दानियाल गुरु पंथ लखाए। हजरत खाज खिदिर तेंइ पाए॥
भए परसन ओहि हजरत खाजे। लेइ मेरए जहँ सइयद राजे॥
ओहि सउँ मइँ पाई जब करनी। उघरी जीभ कथा कबि बरनी॥

दो॥ वेइ सो गुरु हउँ चेला निति बिनवउँ भा चेर।
ओहि हुत देखइ पाएउँ दरस गोसाइँ केर॥ २०॥

20. 1. U *mohi daı khē°.* K *guru mahiudī kaha eka mai sēwā.* Iad *jā kara,* U *tinha kara,* K *jinha mohi khēwā.* 2. K *āgē,* Iad شيخ Ibc سيكه. U *baḍahānū;* Ic U *mohi dīnha.* 3. U K *tinha kē gūrū,* Iad سرخرو Ibc سركهرو Is K *surukhu rū,* U *surakhu rū.* 4. Ias *siddhanha purukhanha jehi sãga khēlā* (Is has *jyaū*), Ic *jai rē siddha purukha sãga khēlā.* K *jinha siddhyā purukhanha sãga khēlā.* 5. U *lagāē,* K *dānīara ...... dekhalāē.* Ibc U *jehi pāē,* K *mana lāē.* All P give خضر, N *khidira.* 6. Ia U K *tehi haj°.* Is *jē haj°.* U *āni milāē saiyada,* K *lau lagāe lei saidū rājē.* 7. Id *jō pāī karanī,* N *saba karanī,* P *jībha parama* (?) (پرم), N *kathā.* 8. *tehi ghara kā haū cēlā,* Id *tehi guru kā haū,* K *waha rē guru,* U K *hwai cēra.* 9. Ia *ohi tai,* U *jehi tai,* K *dēkhana.*

20. Muḥīu'd-dīn was my preceptor, my steersman, and I served him. He crosseth speedily who hath the ferry-fare.[1] Before him was Shēkh Burhān, who brought him on the path and gave him knowledge. His spiritual guide was the good Alhadād, who in the world was a light and beauteous in the faith. He was a disciple of Saiyad Muḥammad. Who e'er enjoyed[2] his fellowship, became a perfected man. To him did Dāniyāl point out the path,—Daniyāl, who consorted with Ḥazrat Khwāja Khiẓr. The Ḥaẓrat Khwāja was pleased with him, and brought him (as a disciple) to Saiyad Rājī Ḥāmid Shāh. From him (Muhīu'd-dīn) did I win all my (good) deeds. My tongue was loosened,[3] and, a poet, I (learned to) tell my tale.[4]

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[1] The fare was the service which the poet rendered his master.

[2] Lit. sported in his company.

[3] Lit. uncovered.

[4] The following account of Malik Muḥammad's spiritual ancestors is taken partly from what the poet himself tells us, and partly from the Urdū gloss and other sources.

He belonged to the *Cishtiyā Nizāmiyā,* that is to say he belonged to the spiritual descent which took its name from the celebrated Niẓāmu'd-dīn Auliyā, the teacher of Amīr Khusrō, who died about 1325 A. D. His disciple was Sīrāju'd-dīn. whose disciple was Shaikh 'Alāu'l-ḥaqq. 'Alāu'l-haqq's son and disciple was Shaikh Nūr Quṭb 'Ālam (d. 1444) of Paṇḍuī, and another disciple was Saiyad Ashraf Jahāngīr (see 18, 1.) Ashraf's most famous disciple was Shaikh Ḥājī, whose disciples were Shaikh Mubārak, and Shaikh Kamāl. Shaikh Nūr Quṭb 'Ālam and Saiyad Ashraf Jahāngīr were fellow disciples (*pīr bhāī,*) and from them eighth in descent came Malik Muḥammad. (Fl. 1540 A. D.)

He was my master and I his disciple, evermore do I bow before him as his slave. Through him did I obtain a sight of the Creator.

The full genealogical table is as follows :—

Niẓāmu'd-dīn (d. 1325 A. D.)
Sirāju'd-dīn.
Shaikh 'Alāu'l-ḥaqq.
Shaikh Nūr Quṭb 'Ālam of Paṇḍuī, and Saiyad Ashraf Jahāngīr (*vide* 18, 1), (son of preceding.)
Shaikh Ḥashāmu'd-din of Mānikpur.
Saiyad Rājī Ḥāmid Shāh
Shaikh Dāniyāl (d. 1586 A. D.).
Saiyad Muḥammad.
Shaikh Alhadād.
Shaikh Burhān
Saiyad Muḥīu'd-dīn (*vide* xx, 1.)
Malik Muḥammad, (1540 A. D.)

Shaikh Ḥājī.
Shaikh Mubārak
and
Shaikh Kamāl.

From this it follows that the poet was not an actual disciple of Saiyad Ashraf Jahāngīr, as might be assumed from xviii, 1 and ff. Malik Muḥammad merely refers to him and praises him as his spiritual ancestor. A tradition makes him the poet's *mantra-guru*, while Muḥīu'd-dīn was his *vidyā-guru*, *i. e.*, the one initiated him, and the other taught him, but this seems to be very improbable, though not inconsistent with Malik Muḥammad's own language. Shaikh Dāniyāl, the fifth in the line before the poet appears to have been a friend of the well-known Khwāja Khiẓr, who introduced him to his preceptor, Saiyad Rājī Ḥāmid Shāh. Shaikh Burhān, Malik Muḥammad's spiritual grandfather resided at Kāl'pī in Bundēl'khaṇḍ, and is said to have died at 100 years of age in A. H., 970, or A. D. 1562-63. See Rep. Arch Sur. Ind. xxi, 131.

As the prophet Muḥammad (see xii, 1) had four friends, so also had the poet Malik Muḥammad. He tells us their names were Malik Yūsuf, Salār Khādim, Miyā̃ Salōnē and Shaikh Baḍē. Concerning these, see the introduction to this paper, and xxii, 1 and ff.

The Urdū gloss concludes (I insert dates and other particulars in parentheses), ‘Those who consider that Ḥaẓrat 'Abdu'l-Qādir Jilānī (b. 1078, d. 1166) (God's mercy be upon him) is descended from Saiyad Muḥīu'd-dīn, and that Saiyad Rājū Qattāl (d. 1403) is descended from Saiyad Rājī are far from being in the right. It is clear that the line of Qadariyās is descended from Ḥaẓrat 'Abdu'l Qādir Jilānī. His preceptor was Ḥaẓrat Abū Saiyad.

‘Saiyad Rājū Qattāl was full brother of Ḥaẓrat Saiyad Jalālu'd-din of Bukhārā (who was known as Makhdūm Jahāniyān Jahān (Gasht Shaikh Jalāl), and was his disciple.) He was a Suharwardiya by sect.

‘Another disciple of Ḥaẓrat Niẓāmu'd-dīn (the founder of Malik Muḥammad's

चौ॥ एक नयन कबि मुहमद गुनी। सोइ बिमोहा जेइ कबि सुनी॥
चाँद जइस जग बिधि अउतारा। दीन्ह कलंक कीन्ह उँजिआरा॥
जग सूझा एकइ नयनाहाँ। उआ सूक अस नखतन्ह माहाँ॥
जउ लहि आँबहि डाभ न होई। तउ लहि सुगँध बसाइ न सोई॥
कीन्ह समुँदर पानि जउ खारा। तउ अति भएउ असूझ अपारा॥
जउ सुमेरु तिरसूल बिनासा। भा कंचन गिरि लागु अकासा॥
जउ लहि घरी कलंक न परा। काँचु होइ नहिं कंचन करा॥

दो॥ एक नयन जस दरपन अउ तेहि निरमर भाउ।
सब रुपवंतइ पाउ गहि मुख जोअहि कइ चाउ॥ २१॥

21. 1. K *kali*, K *kali pānī*. 3. Ids *asa*, K *uā sūra*. 4. U K *ā̃bā ḍābha nahi*. Rām Jasan's edition gives *basāyana sōī*, but all P give بساي نسوي 5. Ia *tau suṭhi*, Ib *tau asa*, Ic *taba ati*, Ids *tau ati kīnha*, K *tau waha bhaeu*. 6. Ias *jaū*. 7. K *kācu hōi kañcana kī kārā*. 8. U *tasa niramala tehi bhāu*. 9. K *rupavanta banā̃wahī*, Ia *rūpawanta gahi jōahī, sō karahī gahi pāu*. Ib *mukha cahahī kai*, J *mukha cāhai kai*, K *mukha dēkhana ke cāu*.

21. Muḥammad the poet was skilful, though he had but one eye,[1] and all who heard him were entranced. Even as God created the moon for the universe, so He put a dark spot upon him, while He made him bright. With that one eye the poet saw in the world, as Venus is brilliant among the other stars.[2] Until there come black spots upon a mango-fruit, it hath no fragrant scent. God made the water of the ocean salt, but nevertheless He made it immeasurably boundless. Mount Mēru was destroyed by (Çiva's) trident,[3] and then it became a mountain of gold,[4] and reached to heaven. Till black firestains defile the crucible, (the ore) remaineth unsmelted, and becometh not pure gold.

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line) was Shaikh Ruknu'd-din Abū 'l-fatḥ Ma'āṣir (fl. 1310), who was also disciple of his own father Shaikh Ṣadru'd-din ('Arif, d. 1309). This last was disciple of his father Shaikh Bahāu'd-dīn Zikariyā (d. 1266) of Mul'tān, who was disciple of Shaikh Shahābu'd-dīn (Suharwardiya, d. 1234), who travelled from city to city as missionary (peace be upon him).'

Makhdūm Jahāniyān was a disciple of Ruknū'd-dīn abovementioned. The Suharwardiyas form a branch of the followers of the *çūfī* sect, and are named from Suharward, a town near Bagdad, the birth place of the founder Shahābu'd-dīn above mentioned.

[1] This means that he was literally blind of one eye. The poet still, however thanks God for all His mercies, and points out that every great and good thing in Nature has some detraction.

[2] Çukra, the regent of the planet Venus has only one eye.

[3] I have not traced this legend. It may be a reference to Indra's cutting off the wings of the mountains.

[4] It is a golden mountain. See Viṣṇu Purāṇa II, 2.

The poet hath but one eye, but it is (bright) as a mirror, and his soul is pure. All that are beautiful clasp his feet, and desire to see his face.

चौ॥ चारि मीत कवि मुहमद पाए। जोरि मिताई सरि पहुँचाए॥
युसुफ मलिक पंडित अउ ग्यानी। पहिलइ भेद बात बेद जानी॥
पुनि सलार कादिन मति माहाँ। खाँडइ दान उभइ निति बाहाँ॥
मिआँ सलोने सिंघ अपारू। बीर खेत रन खरग जुझारू॥
सेख बडे बड सिद्ध बखाना। कइ अदेस सिद्धन्ह बड माना॥
चारि-उ चतुर-दसा गुन पढे। अउ संजोग गोसाईं गढे॥
बिरिख जो आछहि चंदन पासा। चंदन होहिं बेधि तेहि बासा॥

दो॥ मुहमद चारि-उ मीत मिलि भए जो एकइ चित्तु।
एहि जग साथ जो निबहा ओहि जग बिछुरइँ कित्तु॥ २१॥

22. 1. P سر, U *sira*, K *ora*. 2. Ia *yūsufa mallika paṇḍita gyānī*, Ib *bahu gyā°*, Id *baḍa gyā°*, K *jō paṇḍita gyā.°* All N have *isapha* for *yusupha*. Iac K *pahilahi*, K *pahilī*. 3. Iac کادن, Ib کاجن, Id قارن, Is *kandana*. Ib *khā̃ḍahi*, U *ubhai*, K *uṭhai jō bā̃°*. 4. U *apārā*, *jujhārā*, Ia *khēta au*, K *briga sitaraini (?) jo kharaga johārā*. 5. Iabc سیکھ, Id شیخ, Ib K *bakhānī*, *jānī* (K *mānī*), Iabd *baḍa jānā*. Is *sādhunha*. 6. Ia *catura guna dasa wei*, Ib K *dasau guna*. U *cārō catura au dasi guna* (sic), Icd *au sā̃ga jōga*, K *au saba jōga*. Is repeats the last line by a mistake of the copyist. Printed editions have *siṁha jōga*. 7. Ib *jo rōpahi*, U *jo upajai*. K *purukha jo āpē* (آپی for آچھی). K *jau bēdhai bāsā*. 8. Icd *bhā̃*. 9. Ia *sātha nibāhā*. U *yaha jaga ōra nibāhā*. K *sātha jīwana bhā* (جیو نبھا for جیون بھا for جو نبھا). Ia U *bichurahī*.

22. The poet Muḥammad[1] had four friends, who by giving him their friendship raised him to equality with themselves. One was Malik Yūsuf, the learned and wise, who first knew the secret doctrine. The next was Salār Khādim, of mighty mind, whose arms were ever raised either in (wielding) the sword or in (distributing) gifts. The third was Miyā̃ Salōnē, a lion unsurpassed, whose sword fought with heroes in the battle-field. The fourth was Shēkh Baḍē, famed as a sage. He greatly honoured those who were perfected by performing their initiatory rites.[2] All four were learned in the fourteen[3] branches of knowledge, and God himself created their association (with the poet). Let a tree

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[1] So also had the Prophet Muḥammad, see xii, 1. Regarding these four men, see introductory remarks.

[2] *Adēsa* is the initiation of a *cēlā* by a *guru*.

[3] The 4 Vēdas, the 6 Vēdāṅgas, the Purāṇas, the Mīmāṃsā, the Nyāya, and Dharma.

but dwell near a sandal-grove, and if thou pierce it, the odour of sandal cometh from it.

O Muḥammad, when thou hast found these four-friends, and ye all became of one soul, when thou hast accomplished their companionship in this world, how can they be separated in the next?

चौ॰ ॥ जाइस नगर धरम-असथानू । तहाँ आइ कबि कीन्ह बखानू ॥
कइ बिनती पँडितन्ह सउँ भजा । टूटि सँवारहु मेरवहु सजा ॥
हउँ सब कबितन्ह कर पछलगा । किछु कहि चला तबल देइ डगा ॥
हिय भँडार नग अहइ जो पूँजी । खोली जीभ तारु कइ कूँजी ॥
रतन पदारथ बोली बोला । सु-रस पेम-मधु भरी अमोला ॥
जेहि कइ बोलि बिरह कइ घाया । कहँ तेहि भूख नींद कहँ छाया ॥
फेरइ भेस रहइ भा तपा । धूरि लपेटा मानिक छपा ॥
दो॰ ॥ मुहमद कथा जो पेम कइ ना तेहि रकत न माँसु ।
जेइ मुख देखा तेइ हँसा सुनि तेहि आयउ आँसु ॥ २३ ॥

23. 1. Ibd *tahawā̃ bahu* Ic *tahā̃ una kabitanha kī°*. Is *tahā̃ awara*, K *tahā awani*. 2. Ibs U *au bi°*, Id *bīnati kara*. U *kabitanha*. K *au paṇḍ'ta sõ binati bhājā* Ib *bhākhē ... sākhē*, Is *bhājā ... sājā*. Iad *mērehu*. Is *meraehu*. U *ṭāṭi mirāi sā̃wārahu sājā*. K *ṭuṭala sā̃wāraba au merabai sājā*. 3. N *paṇḍitanha*, U *pachilāgā ... ḍāgā*. Is *gai ḍagā*. K *kichu kai cahau kathā kara āgā*. 4. Ia *jō kachu pū̃jī* U *hiyā̃ bhā̃ḍāra āhi naga pū̃jī*. Is *khōlu*, U *lai kū̃°*. Is *tārā kī*. K *khōlau, tāla au kū̃°*. 5. Is U *bōlē bō.°* K *bōlau bō°*. Ia K *pēma rasa*, Ids U *pēma mada*. 6. So Ia. Ib *kā̃hā̃ tehi bhū̃kha kahā̃ tehi kāyā*, Ic *kahā̃ tehi rūpa kahā̃ kai kāyā*, Id *kahā̃ tehi bhū̃kha kahā̃ tehi māyā*. Is *kā tehi bhū̃kha nīda kā māyā*. U K *kahā̃ tehi rūpa kahā̃ tehi māyā*. 7. Ia *lāaī bhēsa*. 8. *kayā*, so U K. It makes good sense. P *kabi jō prēma kā*. Is *kabi jo pirama kā bhā tana rakata*. 9. Ic *sunā to*. Is *sunā tā̃*.

23. The city Jāyas is a holy spot, there came the poet and told his lay. There humbly waited I upon Hindū scholars, and prayed them[1] to correct and mend the broken (metre) and arrangement (of my song). I am a follower of poets, and I go forward saying my say, and beating the drum with the drum-stick to proclaim it.[2] My heart is a treasure-house, and it holdeth a store of precious stones. I opened it with the key of my tongue and palate. I spoke words,—jewels, and rubies, sweet, filled with the wine of love, and priceless. He whose speech is

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[1] *Bhājā* or *bhājā*, is equivalent to *bhrājā*, *i. e.*, *prakāçita kiā*, 'made manifest,' hence 'presented' a petition.

[2] *Pachalāgā* and *ḍāgā* would give better metre. *Ḍāgā* is a drum-stick. The poet means that he is impelled to publish his lay by beat ofdrum, so to speak, *i. e.*, as loudly as possible. A simpler rendering is obtained by amending the text to *kichu kahi calata bōla dei ḍāgā*, 'saying my say, I progress, setting down the feet of Language;' in which language is metaphorically compared to a foot, or step (*ḍāgā*)

wounded by love,[1]—What is hunger or sleep or shade to him? He changeth his appearance, and he remaineth in torture, like a jewel covered and hidden in the dust.

O Muḥammad, the body which love hath, hath neither blood nor flesh. Whoever seeth such a man face to face laugheth, but when the lover heareth the laughter tears come (into his eyes).

चौ॥ सन नउ सइ सइँतालिस अहे। कथा अरंभ बइन कबि कहे ॥
सिंघल दीप पदुमिनी रानी। रतन सेन चितउर गड आनी ॥
अलाउदीन देहिली सुलतानू। राघव चेतन कीन्ह बखानू ॥
सुना साहि गड छेंका आई। हिन्दू तुरकन्ह भई लराई ॥
आदि अंत जस गाथा अही। लिखि भाखा चउपाई कही ॥
कबि बिआस रस कवँला पूरी। दूरि सो निअर निअर सो दूरी ॥
निअरहि दूरि फूल जस काँटा। दूरि जो निअरहि जस गुर चाँटा ॥
दो॥ भवँर आइ बन-खंड सउँ लेइ कवँल रस बास।
दादुर बास न पावई भलहि जो आछइ पास ॥ २४ ॥

इति असतुति खंड ॥ १ ॥

24. 1. Ia *áhã ... káhã.* K *áhī ... káhī* All texts agree in giving the date (A. H.) as 947. Rām Jasan's edition gives 927 which is certainly wrong. Ia *tāhi dina kāhā* 2. *sēni* so Is K. J has *saīna.* 3. Ia *suratānū.* Is *ḍhili sulitānū*, K *dili*, *cētani*, so all N. 4. N have *sāha* not *sāhi*, which is the usual spelling elsewhere. 5. Is *kathā áhī.* Ia *kathā jo ahī*, K *ādī anta kathā asi áhī ...... káhī.* U *bhākhā mai caupāī káhī.* 6. Ic K *biāsa jasa.* Ia *dūri jo niarahi niarē dūrī*, Ics *dūrihi niara niara bhā dūrī*, Id *dūrihi niara jo niarahi dūrī.* U *dūri su niarē niarē dūrī.* 7. Ids *sāga kā̃'*, U *sama kā̃'*. Ic K *duri niara jaisai gura.* Ids *dūri jo niarē sō gura*, U *dūri so niarē jasa.* 8. Ic U K *khaṇḍa tai.* Is *khaṇḍahū.* Id U *ki bāsa*, Is *kai bāsa.* Ib U *pāwahī.* 9. Ib *jō āchai ohi pāsa.* Id K *sadā jo āchai pāsa.* Is *āchahi.*

24. It was the year 947 (of the Hijra,)[2] when the poet began to tell this tale in words. Of Ceylon and Queen Padmāvatī, whom Ratna Sēna brought to Citaur castle; of 'Alāu'd-din, the Sultan of Delhi, and of how Rāghava Caitanya told him of her. How the Emperor heard and besieged the castle, and how there arose the war between the Hindūs and the Muṣalmāns. From beginning to end, just as the story runs, so wrote he it in the language of the people, and told it in verse. The

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[1] Here we have the first instance of the poet's use of the word *biraha.* He uses it to mean love, especially unhappy love. In countless places it cannot possibly have the usual meaning of 'separation from a beloved one.' *Ghāyā* is translated in the Urdū Gloss by بهری 'full of.' I can find no authority for this.

[2] 1540 A. D.

poet, the bard,[1] and the lotus full of nectar, are near to what is far and far from what is near. That which is near is yet far, like the flower and the thorn (so near and yet so different), and that which is far is near, like sugar and the ants (who dwell so far from it, yet find it out).

So the bee[2] cometh from the (distant) forest, and findeth the odour of the lotus-nectar, while the frog ne'er findeth the odour, though he dwelleth (in the pond) close to (the flower).

अथ सिंघल-दीप-बरनन खंड ॥ २ ॥

चौ ॥ सिंघल-दीप कथा अब गावउँ । अउ सो पदुमिनि बरनि सुनावउँ ॥
बरन क दरपन भाँति बिसेखा । जो जेहि रूप सो तइसइ देखा ॥
धनि सो दीप जहँ दीपक नारी । अउ सो पदुमिनि दइ अउतारी ॥
सात दीप बरनइ सब लोगू । एक-उ दीप न ओहि सरि जोगू ॥
दिया-दीप नहि तस उँजिआरा । सरन-दीप सरि होइ न पारा ॥
जंब दीप कहउँ तस नाहीँ । लंक-दीप पूज न परिछाहीँ ॥
दीप कुभसथल आरन परा । दीप मऊसथल मानुस हरा ॥
दो ॥ सब संसार पिरिथुमीँ आए सात-उ दीप ।
एक-उ दीप न ऊतिम सिंघल दीप समीप ॥ २५ ॥

25. 1. Is K *gā̃wau, sunā̃wau*, U *gā̃wō̃, sunā̃wō̃*. Id *au bahu padumini*, J *barana*. 2. U *niramala darapana*, K *badana kudana* (?) *jasa bhānu bisēkhā*, Ia *jō jehi bhā̃ti*. Ib *jehi jasa rūpa soī tasa dēkhā*, Id *jō jehi*, Is *jō jasa rūpa*, U *taisahi*, K *jehi jasa rūpa so taisahi dēkhā*. 3. Id *dhani waha dīpa*. Is *dhanya dēsa jehi dīpaka*. K *dhanya dīpa jehi*. · Ia *daī sā̃wārī*, Ib *au bidhī padumini autārī*, Ia *au jō padumini daī sā̃wārī*, Is *daiya sā̃wārī*, U *asa padumini daī autārī*, K *au padumini daā autārī*. 4 Icds *saba baranai* (Is *baranahi*) *lōgū*. Ibc K *tehi sari*, Id *waha sari*. 5. Ib *wasa nahi ũji°*, U *nahi asa*, K *tasa nahi*. U transposes ll. 5 & 6. Is *sarada-dīpa*, U *sārāga-dīpa*, K *sarā-dīpa*. 6. U *sari nāhī*. Ia *laŋka-dīpa sari pūja na tāhī*, Ib *laŋka-dipa nahī pūjai chāhī*. Ic *laŋka-dīpa pūjai parichāhī*. Id *laŋka-dīpa pūja parichāhī*. U *laŋkā-dīpa na pūjai chāhī*, K *laŋkā-dīpa na puja parichāhī*. 7. *Kumbhasathala*, so Iab U, Ic k-s-th-l; Id, k-s-sā-h-l; Is *kūçasthila*, K *kōsathila*. Is U *pārā, hārā*, K *āra bakhānā*. Ia *mahasthala*, Ib *mai asthala*, Ic *mahūsthala*, Id U *mewasthala*, Is *mahūsthila*, K *mewasthila*. 8. Is K *prīthimī*, U *prathyumī*, Ia *au sāta-u saba dīpa*, Ib *au saba sāta-u dīpa*, U *aura ju sātō̃*, K *au yaha sata-u*. 9. Ia *na ūpamā*, Ib *na ūpara*, Ic *na pā̃ū*, U *uttama*, K *dīpa tehi sarī*.

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[1] *Kabi* is one who makes poems, *biāsa* (*vyāsa*) is one who recites poems.

[2] *I. e.*, a prophet has no honour in his own country. The author means that he is aware that his own country-folk, and his own people (the Musalmāns) will not care for his poem; but, on the other hand men of distant lands and of other religions (the Hindūs) will be attracted by it, as the bee is attracted by the distant lotus.

CANTO II.

SIṂHALA.

25. Now sing I the tale of Siṃhala-dvīpa,[1] and tell of the perfect woman.[2] My description is like an excellent mirror, in which each form is seen as it really is. Happy is that land where the women are lights,[3] and where God created that (famous) Padminī (Padmāvatī). All people tell of seven lands, but none is fit to compare with Siṃhala. The Diyā-land[4] (or land of lamps) is not so bright as it. The land of Saran[5] cannot bear comparison with it. I say that Jambū-land[6] is nowhere like it, and that Laṇka-land cannot even fill (the excellence of) its reflection. The land of Kumbhasthala[7] fled to the forest (before it), and the land of Mahusthala[8] lost its inhabitants.

In the whole universe, in the world are seven lands, but none of them is excellent beside the land of Siṃhala.

चौ॥ गंध्रपसेन सुगंध नरेसू । सो राजा वह ता कर देसू ॥
लंका सुना जो रावन-राजू । ते-ऊ चाहि बड ता कर साजू ॥
छप्पन कोटि कटक दर साजा । सबइ छतरपति अउ गढ-राजा ॥
सोरह सहस घोर घोरसारा । साँव-करन अउ बाँक तुखारा ॥
सात सहस हस्ती सिंघली । जनु कबिलास इरापति बली ॥

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[1] Ceylon. The word *dvipa* means both island and continent.

[2] A Padminī is one of the four classes of women and is supremely the best, see 504 and ff. The Singalese women are all supposed to be Padminīs, *omne ignotum pro mirifico.*

[3] Here there is a pun on the word (*dīpa* = *dvīpa*,) a continent or island, and *dīpaka* a light.

[4] The poet now proceeds to compare Siṃhala, not with the seven continents of tradition, referred to in line 4, and catalogued in the note to stanza I, 5, but with half-a-dozen imaginary continents named after parts of the human body. *Diyā-dīpa*, the land of lights, means the land of eyes. *Sarana-dīpa* (*sravaṇa-dīpa*) means the land of ears. *Jambū-dīpa*, Rose-apple-land, is the land of bosoms, to the nipples of which the rose-apple is often compared. *Laṇka-dīpa*, is the land of hips. *Kumbha-sthala*, jar-land, is the land of rounded breasts; a. v. l. is *gabha-sthala* (*garbha-sthala*) the land of wombs; and finally *mahu-sthala* (*madhya-sthala*), is the land of waists. Under this highly figurative language the poet signifies that the women of Siṃhala surpassed all these imaginary lands, each in its own peculiar excellence. I am indebted to Paṇḍit Sudhākara Dvivēdī for the explanation of this very difficult stanza.

[5] The poet does not seem to be aware that *Sarana-dīpa* (*Saran-dīp*, Serendib) is actually Ceylon itself. Here, as pointed out above, the words also mean 'ear-land.'

[6] Hindūstān or bosom-land.

[7] Or perhaps Gabhastala, one of the nine divisions of Bhārata-varṣa (India); here used as equivalent to *garbha-sthala*, the land of wombs.

[8] Or Mēwasthila.

असु-पती क सिरमउर करावइ। गज-पती क आँकुस गज नावइ॥
नर-पती क कहउँ अउ नरिंदू। भू-पती क जग दोसर इंदू॥
दो॥ अइस चक्कवइ राजा चहुँ खंड भय होइ।
सबइ आइ सिर नावहीँ सरिबर करइ न कोइ॥ २६॥

26. 1. Is K *sēni*, U *Gandharpa saīna sukha khaṇḍi*, Ia *dhana rājā*. Is *rājā au tā*. 2. U K *rājā ... sājā*. U *tāhu cāhi baḍi*, K *tāhi*. 3. Ibc U K *dala*. K *cārau disā kaṭaka Aru gaḍha* is very doubtful. *Uragahi* is a possible reading of the Persian character. The following are the readings of the various MS. Iab اورر کنه Ic ار کنه Id (در ور کنه) Is *ōrā̃gē rājā*, U *ghara ghara rājā*, K *o raŋgana rājā*. All printed editions have *au gaḍha-rājā̃*. 4. U *sōrā̃hi sahā̃sa*, Id *sahā̃sa*, K *sōraha laccha*. Ib *sā̃wa karana ṭā̃kā tū°*, Ic *jasa bā̃ka*, Id *syāma karana bā̃kā tumhārā*, Is *sā̃va karana cālūka tōrākhāra* (sic), U *bara ganē tu°*, K *syāma karana turaākī jō* (sic) *tokhārā*. The text has no difficulty if the technical meaning of *çyāma-karṇa* is remembered, and if it is recognized that *tukhāra* means 'horse.' 5. Id *aru kailāsa*, Is *imi kapilā airāpati*, U *janu ka bilāsa airāpati*, K *sakā bandhi rāutapai* (sic) *ati bālī*. 6. Ia *sohāwai*, Is *asa-pati*, U *asu-pati kā*, *gaja-pati kā*, K *asu-patīnha*, K *gaja-pati sira aŋkusa gaja nāwai*. 7. Ia *nara-pati kahaū jo āhi narindū*, Ib *nara-patī ka au kahaū*, Is U *nara-pati ka kahāwa*, K *nara-pati mahā̃ kahalāwai indū*, Ia *bhū-patī ka mahā̃*, Is *bhua-pati* K *bhua-pati jaga para dōsara ēndū*. 8. Ias U *bhai hōi*, K *mō hōi*. 9. K *sabhai*.

26. Gandharva Sēna was a fragrant[1] prince, He was its king. and that was his dominion. I have heard of Laŋkā,[2] the kingdom of Rāvaṇa; greater even than his was his majesty. Fifty-six times ten millions formed his battle-array, and over all were princes and commanders of forts. Sixteen thousand horses were in his stalls, black-eared and gallant steeds.[3] Seven thousand Singalese elephants had he, each like the mighty Airāvata[4] of Kailāsa.[5] He is called the crown of lords of steeds, and with his goad he causeth to bow low the elephants of lords of elephants. Over lords of men I call him a second Indra, and in the world I also call him the Indra[6] of the lords of earth.

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[1] There is here an alliteration between *Gandhrapa*, Gandharva, and *Gandha*, scent. Some of the MSS. have *Sēni* for *Sēna* throughout the poem. This would lead me to restore the word to the Sanskrit *Sainya*, were there not a strong tradition in favour of *Sēna*.

[2] Laŋkā is, however, a name of Ceylon. The poet neglects this fact.

[3] *Çyāma-karṇa*, black-eared, is a technical name for a horse. It is the kind used in sacrifices. *Tukhāra* means 'horse,' cf. xlvi, 4; and dli, 4.

[4] The name of Indra's elephant.

[5] Indra's heaven.

[6] Here Indra is referred to in two aspects. First he is the mighty king of the lower Gods, and hence supreme over lords of men; and secondly he is the storm-god giving refreshing showers to the earth, and hence an object of worship to everyone who lives by cultivation.

So universal[1] a monarch was he, that all the earth feared him. All men came and bowed their heads before him, no one dared to emulate him.

चौ॥ जबहि दीप निअरावा जाई। जनु कबिलास निअर भा आई॥
घन अँबराउँ लाग चहु पासा। उठइ पुहुमि हुति लागु अकासा॥
तरिवर सबइ मलइ-गिरि लाई। भइ जग छाँह रइनि होइ आई॥
मलइ-समीर सोहाइ छाँहाँ। जेठ जाड लागइ तेहि माँहाँ॥
ओही छाँह रइनि होइ आवइ। हरिअर सबइ अकास देखावइ॥
पंथिक जउँ पहुँचइ सहि घामू। दुख बिसरइ सुख होइ बिसरामू॥
जेइँ वह पाई छाँह अनूपा। बहुरि न आइ सहहिं यह धूपा॥
दो॥ अस अँबराउँ सघन घन बरनि न पारउँ अंत।
फूलइ फरइ छह-उ रितु जानउँ सदा बसंत॥ २७॥

27. 1. Ib *jōhu* (?) (جوہ), *niarāwē*, Icd *jō wahi dīpa*, K *jō wahi dīpa kē niarē jāī*. Ia *bhau āī*, Iabds U *kabilāsa*, K *kailāsa tinha niarē pāī*. 2. U K *ghani ãbarāī*, U *uṭhī bhūmi*, K *uṭhai bhūmi*, Is *lāga*. 3. U *tariwara ū̃cē sabai suhāō*, K *taruari sabhai milē ohi jāī*, Ib *bhai tasi chā̃ha*, Ic *sītala chā̃ha*, U *raini kai āē*, K *hō jaga chāha raini bhai āī*. 4. Ia *sohāwana*. 5. U *abu jamu chā̃ha*, K *au asi chāha raini bhā*. 6. Ia *jaū sahi āwai ghāmū*, U *panthika cali āwai sahi*. K *panthika pahū̃cai sahi kai ghāmā* Ibsk, *ghāmā̃*, *bisrāmā̃*, U *bisarai bhai sukha bisrāmā̃*, K *bisarai chana kai bisrāmā*. 7. Is K *jinha waha*, U *jō pāwai waha chā̃ha* Ia *sō dhūpā*, Ic *dukha dhūpā*, Id *tehi dhūpa*. 8. U *asi ãbarāī suhāwani*, K *asi ãbarāī saghani ghani*, Id *pārai*, Is *parahī* 9. Ic *cahu disa*, K *phūlahī pharahī chaau*, U *mānahu*.

27. When a man approacheth this land, 'tis as it were he approacheth Kailāsa the mount of heaven. Dense mango-groves lie on every side, rising from the earth to the very sky. Each tall tree exhaleth the odours of mount Malaya,[2] and the shade covereth the world as though it were the night. The shade is pleasant with its Malaya-breeze; e'en in the fiery month of Jyaiṣṭha[3] 'tis cool amidst it. It is as though night cometh from that shade, and as though from it cometh the greenness of the sky.[4] When the wayfarer cometh thither, suffering from the heat, he forgetteth his trouble in his blissful rest, and whoso hath found this perfect shade, returneth ne'er again to bear the sun-rays.

So many and so dense are these groves, that I cannot tell their end. The whole six seasons of the year[5] do they flower and fruit, as though it were always spring.

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[1] *Cakkawai* = *Cakravartī*.

[2] The Western Ghauts (*ghāṭs*) famous for their growth of sandal trees.

[3] The hottest month in the year, May-June, with its pitiless burning blue-grey sky.

[4] This is an example of the rhetorical figure *utprēkṣā*, or poetical fancy, with the word expressing comparison omitted. The poet fancifully states that this shade is so dark, that from it is produced all night, while the green shade of the sky is its reflection.

[5] Hindūs divide the year into six seasons of two months each.

ANALYSIS OF THE PADUMĀWATI.

CANTO I.

The Invocation.

Praise of God, the Creator of the universe (1), and of all that is therein, (2); the maker of men and of all that man hath, (3); of pairs of opposites (4). His bounty (5), and might (6). He is an everlasting mystery, neither made nor created nor begotten (7). He is omniscient, omnipotent, omnipresent, neither discrete nor indiscrete (8). He hath endowed man with many blessings, of which he cannot gauge the length or breadth or height (9). His wondrous works are indescribable (10). He made one man for the salvation of the world, the prophet Muḥammad (11), who had four friends, Abū Bakr Çiddīq, 'Umar, 'Uṣmān, and 'Alī (12). Shēr Shāh Sūr is Sultan of Delhi. His might (13), valour (14), justice (15), comeliness (16), and generosity (17). Praise of Saiyad Ashraf Jahāngīr, the poet's spiritual ancestor (18), and his two descendants Shekh Ḥājī, and Shekh Mubārak (19). Praise of Muḥīu'd-dīn, the poet's spiritual preceptor and his spiritual descent from Saiyad Ashraf Jahāngīr (20). The poet's description of himself as blind of one eye. He is grateful to God for all his mercies (21). He had four friends, Malik Yūsuf, Salār Khādim, Miyā̃ Salōnē, and Shēkh Baḍē (22). Filled with poetic inspiration he came to Jāyas, and studied rhetoric under paṇḍits (23); and in the year 1540 A. D., began to write the poem of Ceylon, of Padmāvatī, of Ratna Sēna, of 'Alāu'd-dīn, of Rāghava Caitanya, and the siege of Citaur (24).

CANTO II.

Description of Siṃhala-dvīpa.

I describe Siṃhala, best of all the seven *dvīpas* (25). Gandharva Sēna was its king. No king ever was so mighty (26). The *dvīpa* is covered with cool orchards, throwing inviting shade (27). Its fruit-trees (28). The singing of the birds (29). Its wells and springs, surrounded by holy men of various sects (30). Its tanks (31), the maidens who draw water therefrom (32), the birds that resort thereto (33). The fruit gardens (34), and flower gardens (35). The chief city, Siṃhala (36). Its streets and markets (37), its courtesan quarter (38), the bazārs (39). The citadel, its height (40), its strength (41), its guards and the regularity with which they are changed (42). Its two rivers Nīra and Kṣīra, and the spring of Mōtī Cūra. Its golden tree with magic fruit which gives new youth (43). The four captains of the citadel and their quarters (44). The doorway of the royal palace, with the elephants there (45), the royal stables and horses (46), the royal court (47). The palace buildings (48), the female apartments. The Chief Queen was Rānī Campāvatī (49).[1] She becomes pregnant (50), and a girl is born (51). The naming-ceremony of the 6th night after birth. The Paṇḍits declare her name to be Padmāvatī (52). The astrologers bless her and go home. She grows up of perfect beauty and at the same time learned. Kings of all countries demand her in marriage but are refused (53). She becomes twelve years of age, and the king hearing that she is fit for marriage, builds her a magnificent palace, and gives her damsels to bear her company. She obtains a very learned parrot named Hīrāmaṇi, and studies the çāstras and vēdas with him. Brahmā himself nodded his head as he heard the parrot's explanations (54). Padmāvatī becomes *apta viro.* Her charms (55). The King, hearing that the parrot gives wisdom to Padmāvatī, becomes enraged, and orders it to be killed, that it may not eclipse its pupil. The barber and torch bearer run to kill it, but the Princess hides it, and sends a respectful remonstrance to the king, 'the parrot is only a bird. It loves food and flying, and speaks by rote' (56). The parrot thanks the princess, and says there is no escape from an angry master (57). The Princess replies, 'I cannot bear to lose thee, my darling parrot' (58).

CANTO III.

The Bathing.

On a certain festival Padmāvatī and her damsels go to bathe in a lake. Description of the various damsels (59). They play on the bank of the lake, and call upon the princess to be happy while she may (60). They disrobe (61). They bathe (62). They sport (62*a*).[2] A damsel loses her necklace in the water. They all dive for it (63). The lake, at the contact of their beauty, becomes clear and the necklace is found (64).

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[1] In some copies a new canto commences here.

[2] Rām Jasan gives two stanzas the same number, 62.

CANTO IV.

THE ADVENTURES OF THE PARROT.

While Padmāvati was thus sporting, a maidservant went into her palace to steal her flowers and betel to give to a lover. The parrot remonstrates (64 *a*).[1] The maid in a rage twists the parrot's neck, plucks him, and shuts him up in an earthen pot (64 *b*). The parrot's reflections and self-reproaches. He considers what is best to be done (64 *c*). The maid takes the vessel and throws it and the parrot down a well in the forest. The parrot as he is thrown calls upon God (64 *d*). He has hardly finished his prayer when he sees a fig tree hanging over the well. He climbs into it, finds it full of fruit and thanks God. His feathers grow again (64 *e*).[2] He flies away, and happens on a part of the forest where the birds treat him with great respect. He praises God (65).

When Padmāvati returns, the major-domo tells her that a cat had come into the house, and that the parrot had flown away from the cage. Her grief. She orders search to be made (66). Her maidens assure her that the search is hopeless (67).

When the parrot has rested a few days in the forest, his fellow birds see a hunter, hidden under a screen of leaves, approaching. Smitten with terror at the apparently moving tree they fly away, but the parrot who is absorded in contemplation, is struck by the bird catcher's five-pronged rod, and caught by the bird-lime attached to it (68). The hunter breaks his wings and thrusts him into a cage with other birds, they ask him how a wiseacre like him has been caught (69). The parrot explains that it was his own fault. He had become happy and careless, and pride goes before a fall (70). The birds comfort him. They agree that the hunter should not be blamed for catching them, but their own stupidity and greed (71).

CANTO V.

CITAUR.

Citra Sēna is king of Citaur. His son is Ratna Sēna. Astrologers promise great things for him. He will go to Siṃhala-dvīpa and bring back a lovely treasure (72). Some merchants of Citaur start for Siṃhala-dvīpa to purchase goods. One of them is a poor Brāhman, who starts with borrowed capital. Prices of things in Siṃhala-dvīpa are so high, that he cannot afford to buy anything (73). The others return home with their purchase, and he is left lamenting (74). The hunter brings the parrot for sale in the market. The Brāhman sees it, and asks it if it is learned (75). The parrot replies that when he was free he was learned, but he has lost his knowledge, otherwise how could he be in a cage and hawked in a bazār (76). The hunter and the Brāhman converse. The latter purchases the parrot, and overtakes his companions on the way to Citaur (77). In the meantime Ratna Sēna has succeeded his father Citra Sēna on the throne, news is brought to him of the arrival of merchants from Siṃhala-dvīpa, and amongst them a Brāhman with a wonderful parrot (78). The Brāhman is sent for, brings the parrot, saying he had not intended to sell it, but his belly must be filled and he is poor (79). The parrot introduces himself to the king and praises his own qualifications. Says his mame is Hīrāmaṇi, and that he lived formerly with Padmāvatī (80). The king purchases the parrot for a lākh of rupees, and is pleased with its wisdom. He becomes fond of it, and learns much from it (81).

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[1] From 64(*a*) to 64(*e*) is an interpolation, found only in some copies of very small authority. The style is different from that of the rest of the poem.

[2] The ordinary editions insert a line here making the parrot escape from his cage in Padmāvati's house.

CANTO VI.

THE PARROT AND THE KING.

One day the King goes out hunting, and his chief-queen, Nāgamatī, adorns herself, and, being filled with vanity at her reflection in a mirror, asks the parrot if any one in the world is so beautiful as she (82). The parrot remembering the beauty of Padmāvatī, looks in the Queen's face and laughs. He says all the women of Siṃhala are more beautiful. She becomes angry (83), and considers that if the parrot is allowed to remain in the palace, the king will hear of their beauty, and will fall in love with them and turn a Yōgī. She calls a maidservant, says parrots are treacherous things, and orders it to be killed (84). The maidservant goes to do so, but pauses to consider that the king is fond of the learned bird, and will be sure to ask for it (85), so she only hides it. When the king returns from his hunt he does ask for it. The Queen says a cat has carried it away. 'It was an impudent bird. I asked about the women of Siṃhala, and it called me a Nāginī (snake), and said I was not as beautiful as they. The parrot was pretty but unbearable like a too heavy golden ear-ring' (86). The king is angry, and maintains that the parrot was learned and wise (87). The Queen is afflicted at the king's anger. She goes to the maidservant and laments

(88). The maidservant says the Queen has brought it on herself by being angry. Anger is a bad thing (89). When the Queen is utterly downcast, she returns the parrot to the king, saying to the king that she only wished to test him. She consoles him (90). The king adjures the parrot to tell the truth about his history (91). The parrot says, I am Hīrāmaṇi, the parrot of Padmāvatī, Princess of Ceylon, a lady of peerless beauty (92). The king's curiosity is excited. He asks for further particulars about Padmāvatī, and says he would like to go to Siṃhala (93). Parrot describes the charms of Siṃhala and its women. Its king Gandharva Sēna and his lovely daughter Padmāvatī (94). The king asks the parrot to say all this over again. It complies, and the king becomes enamoured of Padmāvatī from the parrot's description (95). The parrot warns the king, that the way of love is hard, and may cost him his life. 'Learn wisdom from the cry of the peacock, "I die, I die," *mueũ, mueũ*, for he hath given himself up to love.' So also other animals are shown as a warning:—the lizard, the ringdove, and the partridge (96). The King replies that he knows that the path of love is hard at the beginning, but he will dare all for the sake of Padmāvatī. He asks the parrot for a complete account of every feature of his beloved, in the form of a *nakh'sikh* (97).

CANTO VII.

A TALE OF BEAUTY (THE NAKH'SIKH).

The parrot describes Padmāvatī's hair (98), and its parting (99), her forehead (100), eyebrows (101), eyes (102), eyelashes (103), nose (104), lips (105), teeth (106), voice (107), cheeks (108), ears (109), neck (110), arms (111), bosom (112), belly (113), back (114), waist (115), navel (116) and thighs (117).

CANTO VIII.

THE KING'S PASSION.

The King is thrown into a fever by this description of Padmāvatī's beauty, and lies senseless (118). His relations and friends come with doctors. They diagnose the disease as the same as that from which Lakṣmaṇa suffered when struck by Rāvaṇa's arrow, but the magic root which alone cures the disease is not available. They recommend that it should be searched for regardless of cost (119). The King revives, but only raves unintelligently, or cries like a newborn child. He complains that he has been brought back from the city of immortality to that of mortality. He asks to die (120). They remonstrate, and say it is useless to fight with fate. 'Thy love is unattainable, therefore do not yearn for it' (121). The parrot gives similar advice. 'Thou canst not conquer Siṃhala by force of arms. The way is difficult, and can only be traversed by Ascetics, Sannyāsīs, Yōgīs and the like. Thou could'st not bear the discomforts of such a life. An ascetic who doth not practise austerities hath no success (122). No success can be gained without austerities, and thy body is besieged by the thieves of thy passions; awake, fool, ere they steal all that thou hast' (123). The king, aroused by these remonstrances, discovers that he is involved in the darkness of ignorance, and that without a (spiritual) guide he cannot find his way to Padmāvatī (*i.e.* wisdom) (124). His Hindū friends remonstrate, but he refuses to hear them; without a guide (or *guru*), he can do nothing (125). He gives up his kingdom, becomes a Yōgī, and puts on the ascetic dress (126). The astrologers say it is not a lucky day for starting. He retorts that in love-matters, no one considers lucky times or hours. They are for people who are in possession of their senses. 'Doth a *satī* ask if it is a lucky day when she mounteth the funeral pyre? I must start on my quest. Do ye all return to your homes' (127). The captains of his army call upon all to accompany him to Siṃhala, after providing themselves with necessaries (128).

CANTO IX.

THE FAREWELL.

The King's mother implores the king to stay (129). He asks her not to tempt him from the right way. 'Earthly joys are fleeting. My *guru* hath ordered me to journey to Siṃhala. Farewell' (130). Nāgamatī weeps. 'Let me go with thee, as Sītā did with Rāma. Thou wilt find no Padminī as beautiful as I am' (131). He replies, 'When Sītā accompanied Rāma, Rāvaṇa carried her off. I cannot take thee and be a Yōgī. See how Rāja Bhartṛihari left sixteen hundred wives, when he took to a life of mortification,' saying this he starts on his journey (132). His mother weeps. So also his Queens. They break their ornaments. Nine maunds of pearls and ten maunds of crystal bracelets are destroyed. At first there was a great confused sound, and then all was silence (133).

CANTO X.

THE LAND JOURNEY.

The king departs from the city, the people hear of it. Sixteen thousand knights accompany him. They all become Yōgīs, and take the salmon-coloured vestments (134). The good omens at departure. Girls with full waterpots; Goālins crying 'buy my tyre;' flower-girls with garlands; *khañjan* birds seated on snakes' heads; deer to the right, and door-keepers to the left; dark-coloured bullocks lowing on the right, and jackals motionless on the left; white quails in the sky to the left, and foxes coming out and showing themselves; crows on the left, and owls on the right. Vyāsa has promised success to him who sets out with omens such as these (135). He sets out and says, 'Let to-day be a short stage. To-morrow we must take the long journey (*i.e.*, to-day we live, to-morrow we die). There are mountains and rivers to be crossed, with robbers lurking in the bye-ways. He who goeth steadily forward at ten *kōs* a day will arrive safely (136). Go carefully along the road, picking your way, with sandals on your feet. The road is rough and thorny. On the right lies Bidar[1] (Vidarbha) and on the left Candērī, one road goes to Siṃhala-dvīpa and another to Laŋkā (*sic*)' (137). Then says the parrot, 'Let him be guide who knoweth the way. Can the blind lead the blind?' So they asked the way of Vijaya-giri, King of Vijaya-nagara. He says, 'Behind are Kunda and Gōlā (Golconda (?)). Leave on the left (?) Ādhiāra Khaṭōla. To the south on the right lieth Tiliŋga, and directly to the north is the Karahakaṭaŋgā (? Karnāṭak).[2] Midway is the main gate of Ratnapura (Kāncī), and to the left is the hill of Jhārakhaṇḍa (Baij'nāth). To the left front is Orissa, and cross ye the sea to the south' (138). They wander through the forest, and sleep on the ground, the King alone waking through the night, playing on his five-stringed lute, and with his eyes fixed on the road to Padmāvatī (139). After a month's journey they come to the sea-shore. King Gajapati approaches and asks who they are. Ratna Sēna asks for boats (140). Gajapati agrees, but warns him of the danger of the passage. 'There are seven seas to cross, *viz*,—the Kṣāra,[3] the Kṣīra, the Dadhi, the Udadhi, the Surā-jala, the Kilakilākūta (and the Mānasara). There is no one capable of crossing all' (141). The King replies, 'To one in love what is death? I am compelled to follow my path. I am a disciple of Raŋga Nātha (? Kṛiṣṇa, Çrī-raŋga),

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[1] The poet's strong point is certainly not Geography.

[2] All this is simply a tentative paraphrase. The readings have not been established yet. Paṇḍit Sudhākara Dvivedī suggests that the correct reading may be *hoi kara ekaṭaŋgā*, the fabulous land of one-legged men.

[3] The enumeration of the Viṣṇu Purāṇa is Lavaṇa, Ikṣu, Surā, Ghṛita, Dadhi, Dugdha, Jala *Kilakila* is the boiling sound of rushing water. *Kūta* is a *ṭhēṭh* word meaning 'uncertainty, guess.' *Akūta* means 'without uncertainty,' hence 'extreme.' *Kilakilākūta* is the extremely turbulent sea roaring with the boiling caused by subaqueous fire (*baḍavāgni*). The seventh or Mānasara sea is not mentioned till stanza 161. This last name is in direct contradiction to the Purāṇas. Note [2] to stanza 2 above should be corrected according to the above list.

I must go where he leadeth me (142). The sea of love is deeper than any of the seven seas. I am not afraid of them (143). I welcome dangers. I have given away all that I have, perhaps God will pass me over in return' (144). Praise of charity (*diyā*, with puns on *diyā*, a thing given, *diyā* a light, and *diyā*, a continent) (145).

CANTO XI.

THE SHIP.

Gajapati seeing his warnings ineffectual gives fully equipped ships (146). They bring the ships to the shore. A minnow, the size of a mountain, appears. The knights express their devotion to the king (147). The boatmen laugh. 'Sea-fish are bigger than fresh-water ones. This is only a minnow. Wait till you see a salmon, which can swallow a thousand of these at one gulp. Then there is a bird, which can carry off a salmon in its beak' (148). They catch the minnow on a fish-line, with an elephant for bait. They pull it in, with difficulty, and it dies (149). Description of the vast size of the minnow. It is cut up and eaten. The knights again express their devotion, at the same time pointing out the dangers of the sea (150). He expresses his determination to go on in spite of dangers, till he finds Padmāvatī (151).

CANTO XII.

THE SEVEN OCEANS.

They embark, set sail and are tossed about. Faith in a spiritual preceptor leads one across all oceans. They cross the Kṣāra, (salt) sea (152). Description of the Kṣīra (milk) sea (153), of the Dadhi (tyre) sea (154), of the Udadhi (hot) sea (155), of the Surā (wine) sea (156), of the Kilakilākūta (boiling) sea. Its flames and whirlpool (157). Hirāmaṇī, the parrot, explains that this is the most dangerous. It can only be crossed by the elect, and on a path like a sword edge,[1] too narrow even for an ant. He who falls goes to hell. He who crosses safely gets heaven (158). The king gives the betel leaf (token of acceptance of a dangerous task by the recipient) to his followers and encourages them. He is determined to go on (159). The various ships of the fleet. How they fared. First goes the king's ship, and he is led by the parrot. They all pass the Kilakilākūta sea (160). They come to the seventh sea, the Mānasara. Description of this sea. Its delights (161).

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[1] An adaptation of the well-known Muḥammadan legend.

CANTO XIII.

THE ARRIVAL AT SIṂHALA-DVĪPA.

The king notices that the air is balmy (162). Hīrāmaṇi congratulates him, and points out the chief town of Siṃhala-dvīpa (163). He points out the fort, and describes it, and its inaccessibility (164). 'Within it dwelleth Padmāvatī. If thou desire to see her, follow my advice. On that glittering mountain is the temple of Mahādēva. In the latter fortnight of Māgha,[1] occurs the festival of the Çrī-Pañcamī (now called Vasanta Pañcamī). The doors of the temple are opened on that occasion and all the people go there to worship. Padmāvatī will come to worship on that day, and then thou canst meet her. Do thou go and wait at the temple, and I will go to Padmāvatī and ask her to come' (165). The king says he will climb to heaven if necessary, let alone a mountain. The higher he goes the better. Description of the advantages of elevated aims (166), and of the disadvantages of low aims (167). Hīrāmaṇi starts for Padmāvatī's palace, and the king for the mountain. The latter finds a golden temple there, with four doors, and, inside, four pillars. It is a popular place of pilgrimage, for the wishes of pilgrims are granted by it (168).

CANTO XIV.

THE GARDEN, THE GROVE, AND THE TEMPLE.

The king, escorted by 30,000 Yōgīs, circumambulates the temple, and prays for a sight of Padmāvatī (169). A mysterious voice issues from the temple, in answer to his prayers. 'Love conquereth all. He who serveth a God with all his heart and soul, when the God is pleased, obtaineth the fruit of his service.' On hearing this the king seats himself at the eastern door as a Yōgī (170). There, seated on his tiger-skin, he does austerities, ever muttering the name 'Padmāvatī, Padmāvatī.' The eyes of his ecstatic sight are ever fixed on her vision. His very clothes are burned with the heat of his fever (171).

Padmāvatī at this time, by a coincidence, falls into the toils of love. She passes restless nights, and burns with fever (172). Her condition further described. Her nurse asks her what is the matter with her (173). She describes her fevered state (174). The nurse warns her of the dangers of love (175). Padmāvatī replies,—'The pangs of separation from a beloved one are intolerable' (176). Padmāvatī not being comforted, the nurse consoles her, and recommends virtue, (love, of course, means search for wisdom in the allegory), and patience. 'Just as one who restraineth his breath is a Yōgī, so she who restraineth her passions is a *satī*, a virtuous woman. The spring festival of Çrī-Pañcamī approacheth. Worship God on that day' (177). Till the day of the festival is reached, Padmāvatī becomes more and more fevered (178). While she is in this condition, Hīrāmaṇi arrives. She embraces him and weeps. Her companions sympathize (179).

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[1] Note that the month is Pūrṇimānta. The Çrī Pañcamī is the 5th of the light half of Māgha.

CANTO XV.

THE MEETING OF PADMAVĀTĪ AND THE PARROT.

Padmāvatī asks after the parrot's health, and why it had abandoned its cage. The Parrot replies, and tells the story of its escape. 'The hunter sold me to a Brāhman who took me to Jambu-dvīpa. There he took me to Citra Sēna, king of Citaur, who was succeeded by his son (180), named Ratna Sēna. He is all-perfect. I considered him a fit mate for thee, and praised thee to him (181). Fired by my description, he hath been filled with love for thee. He is become a Yōgī and come to Siṃhala with 16,000 knights as his disciples, beside other innumerable friends and companions, who make a crowd like a fair at the temple of Mahādēva. There he is watching for thee. Thou art the lotus and he is the bee' (182). Padmāvatī pleased at the account. She becomes filled with pride. 'Who hath dared to put his hand in the lion's mouth? Who will dare to tell my father? Who in the world is fit to be my husband?' (183). The parrot insists that Ratna is a golden jewel, and is worthy of her, and describes his pitiful condition (184). Padmāvatī affected by the description. 'Let me go and see him burning thus. Yet gold improves by burning. I am to blame for this burning. I will visit him. The festival of spring approacheth. I will go to the temple on pretence of worshipping' (185). She rewards the parrot, who prepares to fly away. She taxes him with faithlessness. He says he must return and give the news to Ratna, who is anxiously awaiting him (186). He comes to Ratna, and tells him the news. 'I have met the Guru Gōrakṣanātha,[1] and he (she) sent a gracious message. The Guru is like the black bee,[2] and the disciple like the fly. That fly alone meeteth the bee, which is ready to give up its life for one meeting.

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[1] Here Padmāvatī (wisdom) is shown as the supreme preceptor of all Yōgis, Gōrakṣanātha.

[2] The Bhṛiṅga, or potter-bee, devours insects and they are born again as Bhṛiṅgas. It is now-a-days called the *kumhariyā*, *bilanī*, or *bisundharī*.

The Guru hath shown great kindness to thee, and hath given thee knowledge in a new incarnation. Thou wilt live by thy death, and the Bhramara-bee will find the lotus, and drink its nectar. The spring time cometh, and then the bee findeth the nectar. The Yōgī who fully beareth austerities obtaineth final success.' (187).

CANTO XVI.

THE SPRING FESTIVAL.

The festival of the Çrī-Pañcamī comes on. Padmāvatī summons her companions to attend her to the temple of Mahādēva (188). They assemble with music, and in gay dresses. All princesses, and of perfect beauty. It is spring time, and they are like spring themselves (189). She starts. Her retinue of various castes (190). Continuation of names of castes (191). They rejoice amongst themselves (192). The fruit they take with them (193). The flowers (194). The musical instruments. They dance as they go (195). They arrive at the temple. The Gods, seeing them, are astonished, and say they must be nymphs escaped from heaven. Other Gods give other similar explanations (196). Padmāvatī enters the temple. She makes her offering of flowers and fruit, and prays. 'All my companions are married. I alone am a maiden. Give me a husband' (197). Mahādēva being struck senseless by her beauty[1] gives no answer. A mysterious voice tells her this. Padmāvatī complains that it is no use praying to Gods like him (198). Just then a companion comes and tells her that she has seen at the eastern door of the temple a remarkable Yōgī, who looks like a prince (199). She goes to see him. Their eyes meet. He falls senseless with love (200). Padmāvatī sprinkles sandal on him to revive him. He does not wake. So, with the sandal, she writes on his chest over his heart, 'Thou hast not learned the art of asking alms. When the damsel came thou didst fall asleep. How canst thou get thy living? If the sun (*i.e.*, thou) be enamoured of the moon (*i.e.*, me), it climbeth to the seventh heaven (*i.e.*, the seventh story of the castle).' She departs with her companions (201). They leave the hill. Lamentations of the Gods at their departure. They are all dead (202). Padmāvatī enters the palace, sleeps, and dreams a wonderful dream. She asks her friends to interpret it (203). They interpret it as meaning her marriage (204).

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[1] Padmāvatī's 'fatal beauty' has this effect on every one who sees her for the first time. So Ratna (200), Rāghava (489), and 'Alāu'd-dīn (609).

CANTO XVII.

THE AUSTERITIES OF RATNA SĒNA.

Ratna Sēna awakes from his faint. His desolation at finding Padmāvatī gone (205). The very sandal on his chest burns him (206). His lamentations (207). He complains of Mahādēva not answering his prayers. Mahādēva is a mere stone. There is no good in watering a rock (208). Mahādēva explains that he himself was struck senseless at Padmāvatī's beauty, and could not help (209). Ratna admits the justice of the excuse. He gives up, and prepares for death (210). He arranges to burn himself to death on a pyre lit by the fire (of separation) which consumes him. The Gods fear that the intense heat will consume the universe (211). Hanumān, who was the guardian of the mountain, goes and warns Pārvatī and Mahēça.[1] 'I, who burned up Laŋkā, am about to be burned by this Yōgī' (212).

CANTO XVIII.

PĀRVATĪ AND MAHĒÇA.

Mahēça, Pārvatī, and Hanumān haste to the temple. They remonstrate with Ratna on the dangers of a general conflagration (213). Ratna accuses Mahēça of wantonly causing his death, and tells of his hopeless love for Padmāvatī. As he says this, the fire of his woe blazes up still more furiously, and, had not Mahēça extinguished it with nectar, the whole world would have been burnt (214). Pārvatī determines to test his passion if it is real or not. She takes the form of a celestial nymph, and tempts him (215). He withstands the temptation (216). Pārvatī recognizes the love as genuine, and recommends Mahādēva to grant him his desire (217). The king recognizes them as Gods (or perfected ones) (*siddha*), for flies do not settle on their body, they do not wink, they throw no shadow, and suffer neither from hunger nor from illusion. Judging from his appearance, this must be Mahēça. Without a Guru no one finds the path, and without Gorakṣanātha, no Yōgī obtains perfection (*siddhi*) (218). He falls at Mahēça's feet, and weeps floods of tears (219). The universe is flooded: Mahēça consoles him. Advises him,—'Until the burglar breaks into the house, he gets no booty. The fort of Siṃhala has seven stories, no one returns alive who once sets foot upon it' (220). Description of the fort, being at the same time a metaphorical description of the human body. At the foot of the fort is a tank with subterranean gallery. Thou must dive into the tank and enter by this, as a thief enters a house by a mine (221).

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[1] The poet identifies Mahēça and Mahādēva as the same person.

The tenth or inmost door (*i.e.*, internal perception)[1] is only to be approached by mystical suppression of breath,[2] and by suppression of self. He who doeth this, understandeth that the 'Ego' is all in all, and alone existeth. He is himself both teacher and pupil, life and death, body and soul (222).

CANTO XIX.

THE ENVIRONMENT OF THE CASTLE.

Ratna having thus received instruction in perfection (*siddhi*) from Mahēça, offers thanks to Gaṇēça, and, under Mahēça's advice, the Yōgīs surround the castle. As a thief first examines a house before attacking it, so intend they to dig a mine. The gates are closed, and the King is informed that an army of Yōgīs is surrounding the fort. He sends messengers to find out the truth (223). The messengers come to Ratna and ask if they are Yōgīs or merchants. Directs them to go to a distance from the fort. The King will be angry. 'If ye be merchants, do your traffic and depart. If ye be Yogis, finish your begging and go' (224). Ratna replies. 'I am come to beg, and will take what the King giveth. Padmāvatī is the daughter of the king, I have become Yōgī for her, and am come here to beg for her' (225). The messenger is angry. Threatens Ratna. 'If the king hear he will let elephants loose on thee, will fire thunderbolts at thee. Thou art demanding a thing thou canst not even see. Art thou mad?' (226.) Ratna replies,—'I am a Yōgī, and can but do what becometh my profession. Thy power is in the elephants of Siṃhala, and mine in the elephant of my Guru. He can destroy thine elephants, and turn mountains into dust' (227). The messenger returns and reports Ratna's words to the king. The latter is enraged, and orders the Yōgīs to be killed. The prime minister remonstrates. 'If thou kill them, they are but beggars; and if thou art defeated, thou wilt be disgraced. Let them remain below the fort. How many Yōgīs have come and gone. Leave them alone, and they will have to go away for want of food' (288). Ratna wonders why the messenger does not return. He writes a letter to Padmāvatī, and sends it to her by the parrot (229), with a verbal message, recalling their former meeting (230), and describing his woes (231). He ties the letter with a golden thread to the parrot's neck. The latter carries it to Padmāvatī. Her lamentable condition (232). She addresses the parrot, and laments her separation. The parrot replies,—'The Yōgī whom thou sawest at the temple of Mahādēva is distraught for thee. He doth nought but murmur thy name' (233). His sufferings. 'His life-blood is reddening the whole world.' Her cruelty in not returning the love (234). 'When thou didst sport at the spring festival, thou didst mix the vermilion of thy forehead with his blood. He wept, and would have burnt himself upon a pyre had not Mahēça and Parvātī intervened. They extinguished the fire and showed him the road,—the road that leadeth to death. The path of love is difficult. If a man climb it, heaven is at the top; if he fall on the way, he falleth into hell. His desire is now but to see thee, whether he receive consolation from thee or die hopeless. He hath sent a letter to thee. Now give the order whether he is to live or to die' (235). He gives her the letter. Poetical description of the effect of the burning words contained in it (236). Padmāvatī takes the letter, but doubts the sincerity of his love (237). She writes a letter in reply:—'When I visited the temple, why didst thou not tie the marriage knot? Thou becamest senseless, and, for modesty, I could not speak before my companions. I threw sandal on thee, but thou didst not awake. Now he, who like the moon, climbeth the sky, and risketh his life, obtaineth his object (238). Other heroes have unavailingly aspired to my hand. I am queen Padmāvatī. I live in the seventh heaven (or story of the castle). He will obtain me who first destroyeth himself (239). I am pleased at receiving thy letter. Dare greatly, and thou wilt obtain me' (240).

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[1] In the previous stanza, the nine openings of the body are described as doors, and the tenth door is internal perception.

[2] One of the exercises of Yōgī austerities.

Description of Ratna's condition, while waiting for a reply to his letter. He is at the point of death, when the parrot arrives with Padmāvatī's letter, which was like medicine to him (241). He revives. The parrot gives him the letter and message of Padmāvatī, *viz.*, 'The Guru calleth his disciple quickly. She wisheth to make thee perfected. Come quickly. Life dwelleth in thy name. Thy way is within mine eyes, and thy place is within my heart' (242). Ratna gets new life. His delight, and desire to obey her (243). He goes by the path which Mahēça had pointed out to him, and dives with his disciples into the tank at the foot of the fort.[1] He finds the door of the secret passage. He finds a zig-zag path, but it is morning when he commences to ascend the fort. There is a noise in the town that thieves have entered the castle (244). King Gandharva Sēna sends for his paṇḍits, and asks them what is the proper punishment for Yōgīs who do house-breaking. They reply, impalement (248). The Prime Minister warns the king to be careful. 'Take care lest these Yōgīs be perfected ones (*siddha*)' (246). The king orders his army to assemble to seize the Yōgīs. The portents which ensue (247). Ratna Sēna's companions wish to fight the army (248). Ratna Sēna dissuades them. He is ready to sacrifice himself (249). The king surrounds them. Ratna consoles them, and sings on his lute in honour of the Guru (250). 'I trust in my Guru and care not for what may happen (251). Padmāvatī is my Guru, and I am her Cēlā. I am her slave' (252). Padmāvatī fades away in Ratna's absence (253). She is heart-broken, her companions sympathize with her (254), and try to console her, but in vain (255).

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[1] See 221.

CANTO XX.

THE CONSOLATION OF PADMĀVATĪ.

The companions console her (256). She laments, asks for poison. She calls for Hīrāmaṇi (257). The nurse brings him. He comforts her. She faints, and recovers (258). He continues; describes Ratna Sēna's condition (259). Hīrāmaṇi feels her pulse, and finds out that the creeper of love has really taken root in her heart. He describes to her the plant (260). Padmāvatī expresses her trust in the parrot: asks him to bring about a meeting between her and her beloved (761). The parrot tells how Ratna had attempted to approach her, but as morning came before he had ascended, he had been seized and condemned to the stake (262). Padmāvatī's consternation. 'If Ratna dies, I shall die too. I am no longer Guru. He is Guru, and I am Cēlā' (263). The parrot replies,—'Although he is thy Cēlā, he is now perfected. Thy perfection hath gone to him, and his sorrows have come to thee. Ye are one in one. He cannot now be harmed by death' (264). She is comforted and tells the parrot to tell Ratna to give up asceticism and act as a king, for he is king of her heart (265).

CANTO XXI.

THE IMPALEMENT.

Ratna is led with his followers to the place of impalement. The people pity him and say he cannot be a Yōgī. He must be a prince in love. When he sees the stake he laughs. The people ask why (266). He replies that he is glad to die. He has wished for death. Asks that there may be no delay (267). They tell him to call the one he loves best to mind. He proclaims his love for Padmāvatī (268).

The Yōgīs being in this danger, the throne of Mahādēva is shaken. He discusses with Pārvatī as to what had best be done. They disguise themselves as bards (bhāṭs) and go with Hanumān to the scene of execution and hide themselves. There Gandharva Sēna has a large army

(269). Ratna is calling to mind Padmāvatī, and thanking Māhēça, who showed him the way to her. Pārvatī moved to pity looks at Mahādēva. She asks Mahādēva to save him (270).

In the meantime Hīrāmaṇi comes to Ratna with the message of Padmāvatī. Ratna Sēna rejoices at the message. The parrot, and, in sympathy with him, all the people, moved to tears. The parrot and the Bard (Mahādēva) agree to risk their lives, and go towards the king Gandharva Sēna (271). The Bard, seeing Gardharva Sēna, and unable to bear Ratna Sēna's ill-treatment, determines to be a man and risk his life. He approaches Gandharva Sēna, and salutes him and the court with his left hand. He says,—'Yōgīs are water. Thou art fire. When these two fight, the fire is extinguished (272). This is not merely a Yōgī. He is a great king. If thou kill him there will be a tremendous battle, and every being will help him. When Mahādēva (his protector) rings his battle-bell, Brahmā, Vāsuki, and the eight elephants of the quarters will appear. Volcanoes will burst forth into action, and mountains will be rent into dust. Kṛiṣṇa will come, and a crowd from Indra's heaven, thirty-three crores of Gods and ninety-six cloud-armies. The ninety *nāthas*[1] and the eighty-four *siddhas* will come. Garuḍa and vultures will hover in the sky' (273).

Gandharva Sēna asks,—'Who is this insolent bard who salutes me with his left hand? Who is this Yōgī who comes to my palace and enters it by a mine like a thief? Indra, Kṛiṣṇa, Brahmā, Vāsuki, the Earth, mount Mēru, the Moon, Sun and Sky, the clouds, the mundane tortoise all fear me. What fear I for all this?' The Bard warns him to have a care (274). He quotes as an example the case of Rāvaṇa who was killed by two ascetics, Rāma and Lakṣmaṇa. Pride goes before a fall (275).

The Bard, seeing the king angry, comes forward humbly, and addresses him. 'Bards are sacred persons. Bards are incarnations of Īçvara. A Bard comes with his life in his hands. He is inviolable.' The king asks why the Bard has been so insolent, and tells him to be more respectful, and to tell who he and the Yōgī are (276). The Bard replies:—'The truth is, there is one Ratna Sēna, son of Citra Sēna, King of Citaur in Jambu-dvīpa. Him alone do I salute with my right hand, and none else. My name is Mahāpātra, and I am his impudent beggar' (277).

Mahadēva ashamed (at the king not believing him, and seeing himself compelled to disclose his real name), still in his character as a bard,[2] again addresses the king in humble language. 'Gandharva Sēna, mighty king, I am an incarnation of Mahēça,[1] hear what I say. I must tell thee what will happen. Why shouldst thou be angry? This is a prince, and not a Yōgī, who heard of Padmāvatī, and became ascetic for her sake. He is the son of a king of Jambu-dvīpa, and what is written in the book of fate cannot be erased. Thy parrot brought him hither, and thou becamest angry thereat. Then this matter was heard in Çiva-lōka. Marry the pair and do a virtuous action. He who begged from thee, will not leave thy door till he dieth. Even though it be a golden cup, give him alms, and kill him not' (278). Gandharva Sēna angrily calls him a beggar-bard, and tells him to go. 'This Yōgī must be impaled. I fear no one. Who is powerful as I (279)?'

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[2] Jagannātha, Vaidyanātha, &c.

[3] *Dasaundhi*, means 'bard." It is the Sanskṛit *daçadhī*, 'the man of ten wits.' It is commonly used together with *bhāṭa*, the two words together meaning 'bard.

Mahēça at length brings up his troops, and puts the Yōgīs behind them. The Prime minister advises the king not to fight, but the latter obstinately persists. Aŋgada, the hero of the Rāmāyaṇa, comes to help the Yōgīs. He begins by flinging five of the king's elephants into the sky (280). The battalion of elephants is ranged so as to protect the rest of the king's army. Hanumān comes and sweeps away the battalion with his tail (281). Īçvara's battle-bell, and Viṣṇu's battle-conch is heard. All the Gods, demons, &c, come down to the fight. Gandharva Sēna falls at Mahādēva's feet, prays for mercy, and offers to give his daughter to whomever he may order (282). Thus Mahēça performs the office of an ambassador; at first bitter, then sweet. Recommends Gandharva Sēna to ask Hīrāmaṇi about Citaur. 'Ratna is a jewel; test him, and marry him to your daughter' (283). The king sends for the parrot and asks him how the Yōgīs came to the palace (284). The parrot begins by flattering the king (285). He tells his adventures and why he brought Ratna here. The king is pleased (286). The king is convinced, first by the words of the bard, and then by those of Hīrāmaṇi. He sends for Ratna Sēna. He is identified as a prince by the thirty-two signs (287). Every one seeing him to be worthy of Padmāvatī, rejoices. The war music is changed to nuptial melodies (288). The king consents to the marriage. The Gods go home. Ratna Sēna and his princes put off their ascetic garments. General happiness (289).

[*Here an Urdū edition adds:—*

The body is Citaur-fort, and the soul is the king. The heart is Siṃhala-dvīpa, and Brahmā is the Padminī. The *guru* is the parrot who sets one on the way. Illusion is 'Alāu'd-dīn, and Satan is Rāghava. Worldly cares are Nāgamatī (the snake-queen), who biteth those who love her.]

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[1] See stanza 212, note[1].

CANTO XXII.

THE MARRIAGE.

The date fixed for the marriage. The preparations (290). The dress for Ratna Sēna (291). The marriage procession (292). Padmāvatī mounts to the top of the palace and watches the procession (293). Her companions point out the bridegroom (294). Padmāvatī's happiness at seeing Ratna. She faints from ecstasy (295). She recovers and explains that she had fainted in sorrow at the thought of leaving her home (296). The arrival of the procession (297). The feast prepared. The table arrangements (298). The food at the feast (299). There is no music, and Ratna and his guests refuse to eat. The Paṇḍit asks why (300). The king explains that there is no music. Sound was created before the Vēdas. When Adam was created, knowledge entered into his body with sound. At mealtimes there should be enjoyment. The eyes, tongue, nose, and ears should all be gratified (301). The Paṇḍit replies that music is intoxicating and excites the passions; hence it is not allowed at meals (302). *Sharbat* and *attar* are distributed; the marriage ceremonies are performed (303). Continuation of marriage ceremonies (304). Ratna Sēna receives the dower, and is invited by Gandharva Sēna to remain in Siṃhala-dvīpa (305).

CANTO XXIII.

THE NUPTIAL CHAMBER.

Ratna Sēna is given a palace to live in (306). Description of it (307). Of the slaves in the nuptial chamber (308). Of the nuptial bed (309). The bridesmaids separate the bride from the bride-groom till night-fall, and proceed to adorn the latter. The weariness of the hours without Padmāvatī (310). At night-fall the bridesmaids come and ask him (teasing him) where she is (311). Ratna entreats to be allowed to meet her (312). (No. 313 not in any edition). His entreaties continued[1] (314). The bridesmaids tease him still. They say they do not know where she is. He is a Yōgi. What has he to do with princesses? She is busy with the twelve methods of adornment (*ābharaṇa*) which are as follows (315),—bathing, application of sandal, vermilion on the parting of the hair, a spangle on the forehead, collyrium, earrings, nose-stud, betel to redden her lips, necklets, armlets, a girdle and anklets. Then there are the sixteen graces (*çriŋgāra*),—four long, four short, four stout, and four thin (316).

Description of Padmāvatī adorning herself (317). Her features

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[1] 310–314 are full of similes derived from chemistry.

(318). Her ornaments (319). Being fully adorned she delays going to her husband. She is frightened at what may happen (320). Her bridesmaids encourage her (321). She sets out for the nuptial chamber. Her charms as she goes (322).

She enters the nuptial chamber. Ratna Sēna is struck senseless by her beauty. They revive him, saying his Guru (*i.e.*, Padmāvatī) is here (323). He takes her arm and leads her to the bed. She modestly shrinks back. She says he is a Yōgī and she does not like him (324). He says he became Yōgī for her sake. He recounts the dangers he has gone through (325). She replies that self-praise is no recommendation. No one ever heard of a Yōgī-king. She teases him. 'Thou art not a Yōgī, but a mere beggar. A Yōgī, by suppression of his breath, can mount into the air and fly in spirit where'er he listeth. Thou art but a beggar disguised as a Yōgī, as Rāvaṇa was who carried off Sītā. When the night sees the moon it is no longer dark, and so, Yōgī, now that thou hast become king thou hast forgotten thy austerities' (316). He repeats that he was but a pilgrim of love. 'Be kind. Even Sītā gave alms to Rāvaṇa. I have become crimson, (*i.e.*, glorious) from the reflection of thy colour, and like the sun have I mounted to the sky. Where the moon is cool, how can I be hot? Therefore, lady, fulfil my heart's desire (327)! She replies (teasing him still). 'Thou sayest thou art crimson. How didst thou get this colour? It is not from thy fine clothes. It seemeth to come from a burning heart. The red *majīṭha* dye cometh from long cooking. The Palāça tree has to be burnt before it beareth its scarlet blossoms. Betel and the areca nut do not become red till caustic lime is added' (328). He replies. 'I have been burnt in the fire of love' (329). Padmāvatī,—'Thou art a wandering Yōgī, thou wilt not remain faithful' (330). Ratna;—'Though I may roam, I will never forget. But I will not even roam' (331). She challenges him to play *caupar*. He consents (332). He admits that he is beaten by her. Figurative comparison of *caupar*, and the game of love[1] (333). Padmāvatī laughs. 'I see indeed thou art crimson from my colour. I went to the temple when Hirāmaṇī told me thou wast there. I was enchanted at thy beauty, and I loved thee (334).[2] What magic art thou master of, that thy pains were reborn in me? I suffered all the pangs that thou didst suffer. There is naught between us now, all

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[1] Till a proper text is obtained it will be impossible to translate 332 and 333 correctly. They are full of metaphorical allusions to the game of *caupar* or *causar*, the Indian Backgammon. I have taken the trouble to learn the game, and have consulted several good players, but none of them can interpret the present printed text satisfactorily.

[2] It is possible that this stanza represents the words of the Prince.

I have, my body, my soul, my youth, my life, I dedicate to thee' (335). Again she adds, 'Verily thou art crimson from my colour. Thou art a Rājā of noble family. But thy home is in Jambu-dvīpa, how didst thou learn of Siṃhala? How did Çaṇkara teach thee this love' (336). Ratna replies, 'I did what Hīrāmaṇī told me, and I became absorbed in thee' (337). She smiles and confesses that she fell into a like state with regard to him at Hīrāmaṇī's words (338). * * * * Morning comes, then Ratna leaves her. The bridesmaids come and see Padmāvatī sleeping (345). They wake her. Her disarray (346). They laugh, and tease her about her disarray and ask how Ratna had treated her (347). She replies that she had learned that there is no one dearer than a husband and that her maiden fears were unfounded (348). She gives further particulars (349). They comment on her disordered condition (350). They run and tell her mother Queen Campāvatī, that Padmāvatī is not well. 'She looketh withered, and her colour is gone.' Campāvatī hearing this, knows what it means, and laughs. She goes with the tiring women to Padmāvatī, kisses and blesses her (351). The women sit round and commiserate Padmāvatī. 'The child is restless,' they say. 'The lotus bud is full of tenderness, and slender, and delicate is her waist. She is like the moon in eclipse, she who shone like the sun with a thousand rays.' They anoint and bathe her, and again she blooms like the full moon (352). They clothe her in beautiful garments (353).

Ratna Sēna appears in public. His friends who accompanied him from Citaur congratulate him (354). He replies and gets 16,000 Padminī girls, and gives them to his friends as wives (355).

Padmāvatī calls her companions, and gives them presents. They rejoice (356). She then goes to Mahādēva's temple and worships him (357).

Night approaches. The bride and bridegroom meet again. Amorous talk. He challenges a fight. She prepares the artillery of her eyes, and calls on him to fight with an equal. She is a Queen and he a Yōgī (358). He replies, 'I am a Yōgī who conquereth both in love and in war. I am both Hanumān and the god of love. A master of horses and of the lower lip. I wound my enemy with the sword, and thy heart also, &c., &c.' (359).

CANTO XXIV.

The six Seasons and the twelve Months.

Spring (*Vasanta*) comes, a season of joy (360). The hot season (*Grīṣma*) (361). The rains (*Pāvasa*) (362). The autumn (*Çarad*)

(363). The cool and dewy season (*Çiçira*) (364). The winter (*Haimanta*) (365).

Queen Nāgamatī, Ratna's deserted wife, in Citaur, laments her lonely lot (366). Her sad state (367). Her companions console her (368). The *Bārah Māsā*, *Aṣāḍha* (369), *Çrāvaṇa* (370), *Bhādra* (371), *Āçvina* (372), *Kārttika* (373), *Agrahāyaṇa* (374), *Pauṣa* (375), *Māgha* (376), *Phālguna* (377), *Caitrā* (378), *Vaiçākha* (379), *Jyaiṣṭha* (380). The year of Nāgamatī's torture again comes round with *Aṣāḍha* (381). Thus month by month she weeps throughout the year (382).

CANTO XXV.

NĀGAMATĪ'S MESSAGE.

Nāgamatī is distraught and wanders in the forest asking the birds for news of her husband (383). She tells the birds her woes (384). A bird named Vihaŋgama[1] hears Nāgamatī's cries at night, and asks her what is the matter, she tells her woes. 'My husband hath become a Yōgī and gone to Siṃhala-dvīpa. I get no news of him (385). I am dry and bare as a lute (naught but wood and strings, *i. e.*, bones and muscles). Who will go and tell my husband (386)? O, tell Padmāvatī to let my husband return to me' (387). The woes of Ratna Sēna's mother Sarasvatī (388).

Vihaŋgama take the message to Siṃhala. The burning message parches all the country. He rests on a tree by the edge of the sea (389). Ratna Sēna is hunting in the forest, and turns to the tree. He ties his horse and sits down. He looks up, sees Vihaŋgama, and asks his name and why he is black. The bird replies 'Two months ago I went to Jambu-dvīpa, I saw a city called Citaur. How can I tell its misery. I am burnt black (390). The Rājā became a Yōgī and departed. The city became empty and dark. His Queen Nāgamatī is burnt by unhappy love. By this time she is probably burnt to ashes. The fire of her woe is consuming the universe, and I was burnt black then, and fled for my life' (391). Ratna Sēna tells who he is and asks for further news (392). Vihaŋgama reproaches him (393), describes his mother's condition (394), and Nāgamatī's (395). The effects of Nāgamatī's sorrow on the outer world (396). The Rājā welcomes the bird, and asks it to come down to him. Vihaŋgama refuses. He prefers freedom (397), and departs. Ratna goes home sorrowful and determines to return to Citaur (398). He is distraught and full of regrets (399).

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[1] *Vihaŋgama*, is also the name of an exercise (*mārga*) of *Yōga*. There is of course here (as throughout) the double meaning.

He sends his compliments to Gandharva Sēna (400). He goes to him and says that he has had news that Citaur is threatened by the Emperor of Delhi, and that his brother is also threatening it. He must go home (401). The court regrets his departure. He asks for a lucky day to be fixed for the departure (402). Padmāvatī ineffectually remonstrates (403). Distress of her companions (404). She calls them and bids them farewell (405). Their lamentations (406). They counsel her to obey her husband (407).

CANTO XXVI.

THE ASTROLOGERS.

The astrologers describe the luck of departures on the various week days (408). On what days of the month the unlucky Yōginī prohibits departure in certain directions (409). The lucky days of the lunar month (410). The signs of the zodiac (411). When the moon and stars are powerful on certain days (412). The Nakṣatras and Yōgas (413).

CANTO XXVII.

THE JOURNEY AND SHIPWRECK.

Padmāvatī mounts her litter (414). She departs with Ratna. Her attendants and their glory. The king sends with Ratna valuable presents (415). Ratna, seeing all this wealth, becomes proud. The sea determines to ask for toll (416). The sea appears in person as a beggar, and asks for charity (417). Ratna angrily refuses. The sea threatens him (418).

Before they get half way across the sea, the wind rises. The ships lose their course (419). A sailor of Vibhīṣaṇa, a frightful Rākṣasa, appears in the sea (420). He is delighted at seeing the ships out of command. 'These Padminīs will be dainty morsels for Vibhīṣaṇa.' He approaches the ship and asks what is the matter (421). Ratna calls him and asks him to show the way. He promises jewelry if he brings the ship safe to land (422). The Rākṣasa offers to conduct the ship to the Sētubandha, if he is given a present beforehand (423). The Rakṣasa takes the ship to where the bones of Mahīrāvaṇa lie, in a great whirlpool. The ship revolves in it. The King calls out 'What are you doing? Here is the Sētubandha' (424). The Rākṣasa laughs. 'This is the city of Mahīrāvaṇa. He used to bear the weight of the earth. When he died his bones remained here' (425). The ship is merged in the whirlpool. The elephants, horses, and men on board all sink. Carnivorous animals assemble. The Rākṣasa dances with delight, but at that moment a huge bird comes and carries him off. The ship is broken to pieces and Ratna and Padmāvatī are floated off in different directions, each clinging to a plank (426).

CANTO XXVIII.

THE SEA AND LAKṢMĪ.

Padmāvatī is borne fainting away. Lakṣmī, the daughter of the Ocean was sporting with her friends on the sea-shore, and just then the plank with Padmāvatī was thrown up by the waves. They go up to look at her (427). Lakṣmī sees the 36 auspicious marks on her, and takes measures to bring her to life. She takes Padmāvatī's head in her lap, and has her fanned. Consciousness returns. They give her water. Then Lakṣmī kindly asks about her troubles, and who she is (428). Padmāvatī opens her eyes. Asks where she is, and who they are. Where is her husband? (429). They say they do not know. They had found her thrown up by the sea. Gradually memory comes to her. She is almost mad with sorrow (430). Her lamentations. She wishes to become *Satī* (431). She uncovers her head to become *Satī*.[1] Her grief (432). Lakṣmī tries to console her. Promises that her father (the Ocean) will watch at every landing place for her husband. Lakṣmī goes to her father and entreats him to bring the husband and wife together (433).

Ratna Sēna is thrown ashore at a high mountain. He ascends it and sees no one. When he thinks of his lost wealth he strikes his beard and weeps. 'Where is Padmāvatī? I have been lost through my egoism (434). Where is Padmāvatī (or wisdom)? I will search for her till I find her (435). Where am I to go to find her? (436). He addresses God (Gosāī̃, the creator). God's might (437). 'Let me die, murmuring Padmāvatī's name, unless thou seest good to reunite us. Yet I fear another separation, if we do meet again' (438). So saying he walks into the sea, and prepares to plunge his dagger into his neck. The Ocean (seeing that his egoism has diminished) approaches him as the form of a Brāhmaṇa. He blesses Ratna and asks for his story. Warns him that suicide is a sin (439). Ratna tells his condition. He owned Padmāvatī and wealth, and has now lost all in the sea (440). The Ocean smiles, and says, 'It is all the fruit of thine egoism. Had all this been really thine, thou wouldst have it still. All is illusion. Everything belongeth to Him who gave them. If he take them back, why dost thou lament?' (441). Ratna,—'I care for naught except Padmāvatī. The sea hath taken her, and I will go to heaven and complain of the injustice' (442). The Ocean,—'Be brave like Rāma, and thou wilt find thy Sitā. Close thine eyes, and I will bring thee to Padmāvatī.' Ratna complies, and immediately the Ocean takes him to where Padmāvatī is (443). Padmāvatī's sorrow (444). Lakṣmī takes the form of Padmāvatī and waits at the landing-place by which Ratna is coming. Ratna seeing her runs to her, but discovers it is not Padmāvatī, and turns from her. Lakṣmī runs to him weeping. 'Why art thou deserting me, my husband?' (445). Ratna says, 'I know thou art not Padmāvatī. Thou art like the jasmine, but hast not the scent'[1] (447). Lakṣmī smiles and offers to conduct him to the jasmine. She brings him to Padmāvatī. To Padmāvatī, she says, 'Drink, O weary lotus. Thy sun who was hidden in the sea hath risen.' To Ratna she says, 'Lo, I have brought the bee to the jasmine' (448). The meeting (449). The same (450). Padmāvatī asks Lakṣmī to restore also all their companions, followers, and property. Lakṣmī goes to her father and gets the request granted. The companions, followers, and property are all returned (451). The Ocean also gives them presents of many precious jewels (452).

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[1] To allow the flames to burst forth. A true *satī* dies of spontaneous combustion That is a general belief of even educated men at the present day in Bihār.

CANTO XXIX.

THE RETURN TO CITAUR.

They remain ten days as guests of the Ocean, and then take leave. The Ocean gives Ratna five priceless jewels (*naga*), viz., *Amṛita* (ambrosia), *Haṁça* (the swan), *Simurgh* (the father of all birds), the Young Lion, and the Philosopher's stone.[2] They mount on horseback, and set out escorted by a merman (*jala-manuṣa*), after bidding farewell to the Ocean's wife. The merman conducts them to Jagannāth (453). They worship at Jagannāth and spend all their money there. The King's reflections to Padmāvatī on the necessity of money (454). Padmāvatī says that Lakṣmī gave her at starting a betel leaf in which a number of jewels were wrapped up. He should sell one of these and put himself in funds. Ratna collects his followers and starts for home (455). They approach Citaur (456). Their feelings after the long absence (457).

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[1] 446 is missing in Rām Jasan's edition.

[2] These five mystic jewels, the translation of which, it will be seen, presents some difficulty, have a prominent part in the story, *vide* 500, 526, 573.

Nāgamatī hears of the king's approach. Her happiness. She adorns herself. Her companions ask her why she is so happy (458). She explains. A herald comes and proclaims the arrival of the King (459). The general rejoicings in the city. Ratna's brothers ride out to meet him (460). Music. Ratna arrives and greets his mother. The temples are adorned. Padmāvatī's litter arrives. Nāgamatī's jealousy; so Padmāvatī is taken to a separate palace. The news about Padmāvatī spreads abroad (461). Ratna mounts the throne. Charity distributed. He embraces his brothers and relations, and makes them presents. Music. Holy men of all sects assemble (262).

At nightfall Ratna visits Nāgamatī; filled with jealousy of Padmāvatī, she sits with her face turned away from him. She reproaches him (463). He comforts her. Says he still loves her. He embraces her (464). She is consoled; laughs, and asks what kind of women he met in his travels. 'Is Padmāvatī as beautiful as I am? Bees wander from flower to flower.' He explains that he cannot compare the two. There he loves one, here he loves another (465). Night passes in conversation. In the morning he goes to Padmāvatī. She reproaches him for deserting her for Nāgamatī (466). He says he loves her alone. She tells him he should not go to Nāgamatī (467).

CANTO XXX.

THE RIVAL QUEENS.

The beauty of Nāgamatī's garden. She goes into it with her companions (468). Padmāvatī is told of this, 'Nāgamatī is in the garden and the king is sporting with her and her companions' (469). Padmāvatī cannot contain her wrath. She hastens to the garden with her companions. She meets her co-wife, they smile and sit down together on the same seat, with sweet words, but hatred in their hearts. Padmāvatī remarks on the beauty of the garden, and adds that it is not right that the Sugādhrāw flower should be in the same garden with the jasmine and the Nāgēsar. Who cares for Jāmun fruit if the Mango grows with it in the same garden (470)? Nāgamatī replies, 'That fruit is the best which the bee loveth. The Jāmun, the Kastūrī, and the Cōā fruits are (it is true) all black, (but still they are the best). The mango is set on high but it weepeth in its heart out of jealousy of them, for the bee loves them and not the mango. So doth the bee love the black Jāmun that he hath planted it in the midst of his garden' (471). Padmāvatī replies that the shrubs in her garden may be thorny, but the fruit is not so bitter as in Nāgamatī's. In the latter there are no oranges or vines, and so on. 'Remain in thine own garden and do not fight with me. There is no flower equal to the jasmine' (472). Nāgamatī praises the fruits of her own garden. 'When a tree bears fruit, people throw clods at it. When a tree bends humbly down, it is because of the weight of its fruit. I am beautiful, may she who separated me from my love be burnt to ashes. My love is a Rājā, thine is a Yōgī' (473). Padmāvatī,—'I am a perfect lotus. I was created to be worshipped. Thou art the snake (*nāga*) of the world, to every one. Thou art dark-featured. Thou art a black bird, and I a swan. I am a pearl-broidered, and thou art a glass-bead-broidered bodice. Thou art an emerald dulled by being beside a diamond. Thou art eclipse, and I the moon. A dark night is not equal to the day' (474). Nāgamatī,—Thou art hard within, like a lotus. Thou spendest thy night lamenting thy husband's absence' (475). Padmāvatī,—'I am the lotus beloved of the sun. My heart expandeth when he shineth; while thou, gazing regretfully at the sky, art dried and burnt up. He and I are all in all to each other. Thou art like a wild fig full of flies, whose wings are born, but when it is time for them to die. Thou art a *nāgin* (snake) whose bite is mortal' (476). Nāgamatī,—'A lotus bloometh when the sun riseth, but its roots, if touched, foul the water. It grows in stinking slime, and its companions are fish and frogs and turtles. If it be washed a thousand times it will still stink. What shall I say to that beloved who has put coals of fire on my head? In the hope of sport with him, thou hast won and I have lost' (477). Padmāvatī,—'Yes, I have won all the charms of the world, my face from the moon, my hair from the black snake, my eyes from the deer, my throat from the voice of the koil, &c. To my form I gave the fragrance of Malaya. Thou art envious of me' (478). Nāgamatī,—'Why art thou proud of charms borrowed from others. I am dark with brilliant eyes, my face is fair, and my voice is like the cātaka's, my nose is like a sword, my brow like a bow, &c.' (479). Padmāvatī unable to bear any longer cries, 'Nāgamatī, thou snake, speak no more.' Then each speaks at the same time. They scream and fight like nymphs wrestling. Each holds the other's arms; bosom to bosom, neither turns back. In vain each tries to bring the other down. No one dares to interfere (480).

The wind whispers in Ratna's ears what is going on. He hastens there and remonstrates. 'Do ye not understand that sometimes it is night, and sometimes day? Ye are like the Ganges and the Jamunā' (481). The two wives embrace. He takes them into the palace and feeds them. He gives Nāgamatī a golden palace, and Padmāvatī a silver one. They live happily (482). In due course Nāgamatī has a son, named Naga Séna, and Padmāvatī a son called Kamala Sēna. Astrologers prophesy that both will be great *rājās.* They are richly rewarded (483).

CANTO XXXI.

Rāghava Caitanya.

Amongst the paṇḍits attached to Ratna Sēna's court was one Rāghava Caitanya. He is the wisest of them all (484). Every one has his unlucky moment. One day when it was the first day of the new moon, the king asks when the second of the lunar month would come. Rāghava, by a slip of the tongue says 'to-day.' All the other paṇḍits say 'to-morrow.' Piqued, he adheres to his statement, and, by force of magic, when evening comes, makes the moon appear as if it was the moon of the second day (485). The paṇḍits disgusted. Next day comes, and, behold, the moon is again the moon of the second. They accuse him of being a wizard (486). Ratna in a rage orders Rāghava to be expelled from the country as a wizard (487). Padmāvatī hears of this, and by her fore-knowledge perceives that the expulsion will lead to calamity. She sends for Rāghava to the foot of the palace. A Brāhman will go anywhere for hope of a reward, *in cœlum jusseris ibit.*[1] He comes there (488). Padmāvatī appears at the lattice above, like a spotless moon. Rāghava blesses her. She gives him a bracelet. As she does so the string of her necklace breaks, and the stones of it also fall. Rāghava, startled by her glory and the jewels, falls senseless (489). Padmāvatī smiles and tells her maidens to revive him. They take him to the shade, and ask him what ails him (490). Rāghava comes to himself with difficulty, and casts his eyes towards the lattice. He speaks incoherently of having been robbed. 'When Padmāvatī looked at me, it was like a *ṭhag's* poisoned sweetmeat' (491). He tells how he has been striken by Padmāvatī's eyes (492). The maidens conclude that he has gone mad. They admonish him, and say that many men have been struck senseless by Padmāvatī's beauty, but she is unattainable (493). He comes to himself. He determines to profit by what he has seen. 'I will try and earn another bracelet. The Turk has come to Delhi,—Shāh 'Alāu'd-dīn, the Emperor. In his mint gold is melted and twelve kinds of dinārs are made. To him will I describe the lotus, and he will come and be the sun to it' (494).

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[1] *Svarga jāe jō hōe bolāwā.*

CANTO XXXII.

Rāghava's journey to Delhi.

Rāghava starts for Delhi. He reaches the door of the Emperor's court. Can get no admission, and is in danger of being trampled to death by the crowds of horses (485). The Emperor knew all that was going on. He hears that a Brāhman beggar is standing at his gate with a bracelet in his hand (486). He sends for Rāghava. He has pity on foreigners. He also has been one (497). Rāghava appears. The Emperor asks, 'Why dost thou beg when possessed of such a bracelet?' He replies that Ratna Sēna has a lovely Padminī of Siṃhaladvīpa, for his wife, in Citaur. 'She is beauteous as the moon. She appeared at the lattice, gave me this bracelet for a reward, and took away my life' (498). The Emperor laughs and does not believe him. 'Thou art praising up a piece of glass. Where is this matchless lady? I have sixteen hundred, and, if there is a perfectly beautiful lady anywhere, she is in my palace' (499). Rāghava replies,—'Thou art an emperor, and I a beggar. I have travelled East and West, North and South, but there are four things that thou hast not got, the Padminī, Amṛita, Haṃça, and the lion's cub.[1] I have travelled far and wide and if I am ordered, I will describe the four kinds of women, the Hastinī, the Siṃhinī, the Citriṇī, and the Padminī (500).

CANTO XXXIII.

The tale of Fair Women.

Description of the Hastinī (501), the Siṃhinī (502), the Citriṇī (503). General account of the Padminī (504). Further particulars (505). Such is the Padminī who has come to Citaur (506). The dangers of her beauty (507). The lightning of her smile (508). Her raven locks (509). The parting of her hair (510). Her brow (511). her eyebrows (512), her eyes (513), her nose (514), her lips (515), her teeth (516), her voice (517), her ear (518), her cheek (519), her neck (520), her arms (521), her bosom (522), her gait (523), her delicate grace (524).

The Emperor is struck senseless by this description of Padmāvatī's beauty. He becomes enamoured of her, and asks Rāghava once more to tell him about Citaur and the Padminī (525). Rāghava says that beside her there are five other jewels in Citaur,[2] and describes them (526). The Emperor richly rewards Rāghava, giving him not only elephants and horses, but a pair to the bracelet, in which were fixed thirty crores worth of jewels. He promises Rāghava the throne of Citaur on the day on which he obtains possession of Padmāvati. 'I will first take the five jewels and then her.' He calls Sur'jā the wrestler,[1] and gives him a letter to take quickly to the king of Citaur-fort. The king (Ratna) receives the letter which, after the usual polite expressions, runs, 'Send me, quickly, the Padminī of Siṃhala-dvīpa' (527).

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[1] See 453.

[2] See 453 and 500.

CANTO XXXIV.

THE WAR BETWEEN THE KING AND THE EMPEROR.

Ratna's rage on hearing the letter read. He will not kill Sur'jā for the insult. 'A thirst which the sea cannot extinguish is not affected by a little dew' (528). Sur'jā replies,—'I am come here prepared to die. The Emperor sent me knowing this. Beware of his power. He can destroy thee if he will. Citaur existeth but by his favour. If thou wilt give the Padminī, thou may'st keep Citaur, and will be given Canderī in addition' (529). King,—'If my wife go, what is Citaur, and what Canderī? I am ready to fight like Hammīra, of Ran'thambhaur; like Hanumān, or Rāma Candra. I have founded an era, like Vikrama. If the Emperor want money, I will give it him; but if he wish a Padminī, let him go to Siṃhala-dvīpa, and fetch one' (530). Sur'jā,—'Boast not, O king! All the earth boweth before the Emperor. If he wish to go to Siṃhala, he can, but the day he besieges thy fort, he will take all that thou dost possess. Be advised in time' (531)! King,—'Go and tell the Turk not to run hither to his death, like Alexander, who hastened to the Kajalī forest for ambrosia, but obtained naught but regrets. My fort is strong. Let him come to attack it when he wisheth' (532). Sur'jā returns to the Emperor, and reports. The King refuses to listen. The Sultan's rage. He declares he will destroy Citaur like Ran'thambhaur (533).

He sends out letters in all directions, and calls his nobles. The countless army which assembles (the stock similes) (534). Enumeration of the various kinds of horses (535). The elephants (536). The nobles, and the various countries they come from (537). The equipment. They march (538). The terror inspired in the various citadels on the way (539). Only two citadels stand firm, Citaur and Kambhal'nēr.[2] Ratna hears of the approach of the Turk. He sends letters to all Hindū Rājās,—'Citaur, the holy place of Hindūs, is being attacked by Turks. The sea is in flood and there is no embankment.

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[1] See 682.

[2] This fort plays a prominent part in the poem subsequently; see 628 and ff.

I alone am the dyke. Help it, for your own sakes, otherwise he will attack you all. As long as the dyke remaineth standing, it is well, but once it is breached, the flood cannot be stopped. The betel[1] is ready.' (540). A similar message is sent by Ratna to the Hindū Rājās who are bound by feudal ties to the Emperor. They meet and approach the Emperor, saying, 'Citaur is the mother of the Hīndūs, nor can we forget the relationship, even though it cause us peril. Ratna Sēna is ready to sacrifice himsef, and he is the greatest King amongst the Hindūs. Be friendly and forgive him, or else give us betel as a token that we may depart. Then will we go and die, that the name of our honour be not wiped out.' The Emperor gives them leave to go, and three days' law (541). Ratna Sēna puts Citaur in battle array. The kings come and salute him. Enumeration of Rāj'pūt tribes. They are ready to fight to the death (542). The citadel is provisioned for a seven years' siege. A strong moat is dug zig-zag round it. Range over range of cannon. The battlements crowded with warriors, &c. (543).

The Emperor marches. Description of the effect of the cavalry and elephants (544). The cannon (545). Comparison of a cannon with a lovely woman (546). The progress of the elephants (547). Further description of the progress of the elephants. The dust raised made the world dark as the Kajalī forest, when Alexander went to it (548). The dust and consequent darkness (549).

The army approaches Citaur. Ratna and his generals mount the battlements to see it, but its rear reaches so far as to be invisible. The Queen ascends to the roof of the palace, crying, 'Lucky am I in having a king, against whom the Turks have had to raise such an army' (550). Ratna is undismayed at the sight. He and his friends prepare for a sally of cavalry (551). Description of Ratna's steed (552), and of the royal elephants (553). The cavalry and elephants are ready for the fray. In front are the chariots, and in the rear are the death-flags, behind which there is no retreat. The army sallies forth (554). The two armies meet in conflict (555).

CANTO XXXV.

THE TRUCE.

Description of the elephants fighting (556). The hand-to-hand fight (557). The terrific combat. Delight of ghouls (558).[2] The Emperor urges on more soldiers to meet the ever-advancing Hindūs

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[1] Taken by a hero before going on a desperate fight.

[2] Throughout the following the King and his army are compared to the moon, and the Emperor and his army to the sun.

(559). The Rāj'pūts are beaten back by the Emperor's troops, as a lily closes before the sun (560). The Emperor attacks the fort in the day time (561). By night, the 'Moon' (*i. e.*, the Rāja) rises, and fires blazing bombs at the enemy, which cannot be withstood (562). At day-break, the 'Sun' (the Emperor) again comes forth, and attacks the citadel. The fight lasts the whole day, without result, and so affairs go on day by day (563). The Emperor lays a mine, and bombards the fort. His artillery is officered by Abyssinians (*Habshī*), Greeks (*Rūmī*), and Portuguese (*Firaŋgī*). The mine explodes (564). The confusion which arises and the damage done in the fort (565). The King, so far from being dismayed, makes arrangements for a dancing entertainment, in full view of the Emperor. Catalogue of the musical instruments. Every device of joy is there; five nautch girls dance. While the Emperor is besieging the fort, the king is diverting himself with a nautch (566). Description of the songs. High up on the fort the dance proceeds, while below the Turks fire off their cannon, as their generals watch the entertainment, rubbing their hands, beating their heads, and crying, 'When will these fall into our hands?' (567). The Dancers (568). In the course of the dance, one of the dancing girls turns her back towards where the Emperor is sitting, down below. The Emperor is angry at the insult. He orders arrows to be fired, and the arrow fired by Jahāngīr, Rājā of Kannauj, strikes the girl, and she is killed. The nautch is stopped. The Turks below applaud the shot (569). The King's people build ramparts of earth and repair the damage caused by the explosion (570). They make preparations for performing *Jūnhar*, if the worst comes to the worst (571).

The siege goes on for eight years. Trees planted by the Emperor grow up and bear fruit. He becomes weary of his task. Just then news comes that, 'Harēwā,[1] the Lord of the West, who used to fly before thee, has now stood up to face thee. He whose face was in the ground has raised his head to heaven crying, "The Emperor is safe fastened at Citaur"' (572). Hearing this, the Emperor meditates, and determines to take Ratna by treachery. He sends Sur'jā, telling him to go to the king and speak gently to him: say, 'I will not take the Padminī. If I am but allowed to see her, I will raise the siege. Take Nehicala and Candērī, in addition to thine own dominions, and only give me the five jewels[2] which the sea gave thee' (573). Sur'jā goes to the king, and commences by explaining that the Emperor has him like a bird in a cage, and can crush him at any moment, as he did Hammīra (574). The king replies, 'I am not an era-maker like Hammīra, like Bhōja, or

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[1] By tradition, Harēwā is said to have been a noted *ṭhag* chief.

[2] See 453.

Vikrama. But still we have withstood the siege for seven years, and have no want of food. There is also a plentiful natural spring of water. We are still ready to fight, and are still prepared, if need be, to die' (575). Sur'jā,—'O king, he who disobeyeth the Emperor must finally be destroyed,' and so on. 'Thy fort is on the point of crumbling, take heed to what I say if thou would'st escape. Let him see thy five jewels. If his soul is pleased with one, he will forgive all thy wickedness' (576). King,—'The Emperor is my elder (or superior). He can forgive me and do what he wisheth. What are my five jewels? My whole treasury is his. Can Darius cope with Alexander? What thou hast said, I humbly accept, but I will not be satisfied without an oath.' Sur'jā takes the oath with intent to act treacherously, and the king accepts it and summons a herald (577), to whom he makes over the five jewels, and despatches him to the Emperor, with this message,—'O, sun of the world! light of the earth! the black crow boweth himself humbly before thee. Thy glorious light illumineth the world. Nothing in the nine continents is hid from thee. Anger and mercy are both at thy service, thou killest in thy fierce sunshine, and revivest in thy shadow. Let not the Sun be angry with the Moon, who is eclipsed, and confined in a cage. To-morrow morn, the crow will humbly approach thee' (578). When the herald finishes his message, the Emperor replies. He reproaches Ratna for disobedience. This disobedience has made the crow's feathers black (579). 'Go tell the king that, if he is true, there is no fear. He who trusteth himself to me is safe from harm. To-morrow the Sun, (*i. e.*, the Emperor) will visit the fort, that thou may'st lay thine arms before him.' The Herald, taking the betel of friendship, returns to the king, and gives the Emperor's message. The King immediately orders preparations to be made for a feast for the Emperor (580).

CANTO XXXVI.

THE FEAST TO THE EMPEROR.

Description of the animals and fowl brought for the feast (581), the fish (582), the wheat and cakes (583), the rice (584), the spices for the meat (585). The pasties and fruit (586). The way the fish are cooked (587). How the vegetables are cooked (588). The pulse-meal cakes (*barā*) (589). The sweetmeats (590). Everything that is abovementioned has first to be treated with water before cooking. Praise of water (591).

They spend the night in cooking. In the morning the Emperor comes, preceded by Rāghava Caitanya (592).

CANTO XXXVII.

THE EMPEROR'S VISIT TO THE FORT.

Description of the seven-storied palace. The King meets the Emperor at the gate. The Emperor admires the fort (593). Beauty of the palace. Its gardens and temples (594). The Emperor, looking round, notices Padmāvatī's palace. Its beauty, and the way in which it is guarded (595). He arrives at the seventh story. Its magnificence, with its wonderful mirrors. The Emperor is seated on a magnificent throne amidst the mirrors. But he thinks most of all of Padmāvatī (596), who however is not visible. The King's hospitality. The Emperor converses with the king, but his soul longs for Padmāvatī (597).

Gōrā and Bādal[1] suspect the Emperor, and whisper to Ratna that they fear treachery (598). Ratna refuses to believe them, especially as treachery always recoils on itself. Witness the Pāṇḍavas and the Kauravas (599).

The King has 1,600 women slaves, out of whom he selects 84, whom he produces before the Emperor. They all use the artillery of their eyes upon him. He asks Rāghava, which of them is Padmāvatī (600). Rāghava replies,—'These are only her maidservants. These are merely the pearls which set off the diamond. As long as you look upwards (towards the lattice windows of the female apartments), she will not look up.' The Emperor immediately ceases looking up, 'A guest has no right to do so. I will act like Arjuna, and succeed with a reflection in a mirror' (601). He is served with food by damsels beauteous as Indra's nymphs (602). He cannot eat (603) or drink, 'I would drink with mine eyes, and not with my tongue' (604). The meal being over, the king waits upon the emperor, offers him trays of jewels, and asks for forgiveness, and that the sun of the Emperor's kindness may shine upon him (605). The Emperor expresses himself pleased, tells him to retain his own country, and to have the land of *Mārō* in addition. He leans upon the King's shoulder, so that, deceiving him by a show of affection, he may capture him by fraud (606). The Emperor sits down to a game of chess with the King, first arranging a mirror on the wall so that it may reflect the lattice window of the female apartments. He sits facing the mirror. The game of chess described metaphorically (607).

The maidens who had served the Emperor go to Padmāvatī, describe him to her, and advise her to look at him, or she will miss a sight she will not have a chance of seeing again (608). She goes to the lattice and looks out, and the Emperor sees her reflection in the mirror. He who has been desiring a castle (*rukh*) in the game of chess, is checkmated when he sees Padmāvatī's face (*rukh*). He falls into a stupor. The king, not knowing the reason, expresses concern. Rāghava says he is only overcome by the betel nut,[1] and has him put to bed. Night passes. The Emperor comes to himself in the morning (609). Padmāvatī has disappeared, and the Emperor rises, looking like a *Yōgī*. Rāghava goes to him, saying,—'Hath the lotus become poison, when it saw the sun? Thou art all-powerful. Why art thou so destraught?' (610). Emperor,—'I have seen a wondrous vision. A curtain which had been before my eyes was raised. I saw in my mind a lake, in which water had been, and was no longer. Heaven came down and covered the earth. It came upon the earth but I could not grasp it. Again I saw in it a lofty temple. It was within reach of my hand but I could not touch it. In it, I saw, in my mind, an image, but it appeared without body and without life. It was bright as the full-moon, but, like the philosopher's stone, it showed itself and disappeared. Now my life is where that full moon is. How can the sun find the new moon? The lotus bloomed at night, like a flash of lightning (611). That beauteous form hath entered into my soul and dragged out my life. I saw a lion's waist, the might of an elephant, snakes for the elephant goad, and a peacock for its rider. Over it was a lotus blooming, round which bees hovered and drank the odour. Two fluttering *Khañjan* birds, between which sat a parrot, while a two-days-old moon rose with a bow in its hand. A deer appeared and then became invisible. The moon became a snake, and the sun a lamp. I saw it very high, and then start away. Mine eyes followed it, but I could not reach it. While I gazed at it, it faded away. It went, as I gazed and meditated on it' (612). Rāghava explains the vision. 'The wondrous form which thou didst see was certainly Padmāvatī. She hath a little waist like a tiger's, and her gait is that of an elephant. Her neck is graceful as a peacock's, and her hair (brilliant as the lamp of the sun) resembleth black curling snakes. Her face was the lotus, exhaling gentle odour to the Zephyr, the fluttering *khañjans* were her eyes, and the parrot her nose. The bow is her eyebrows, and the two-day moon her brow. She is that deer which appeared and became invisible, whose locks are like black snakes, and whose soul is a lamp. Thou did'st see her reflection in the mirror, and therefore the image which thou did'st see had no life within it. Now take thought and act. He tasteth the fragrance of those locks on whose lips they fall' (613).[1]

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[1] See 656.

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[1] The Area nut eaten with betel sometimes causes faintness. The idiom used for it is *sōpārī lag gaī hai.*

CANTO XXXVIII.

THE CAPTURE OF THE KING.

The Emperor asks for his litter, and starts on his return to the camp. The King, delighted at his kindly words sees him off, and heedlessly accompanies him part of the way. The Emperor, conversing with the King, leans his hand upon his shoulder in a friendly way, and uses words which are sweet in the mouth, but poison in the belly (614). As the Emperor passes Padmāvatī's palace, she is filled with forebodings. As they pass the first palace, the Emperor gives the King a robe of honour, a hundred horses, thirty elephants, a kettle-drum, and a spice vessel.[2] As they pass the second palace, he gives cavalry; at the third, costly jewels; at the fourth, 10 millions of money; at the fifth, two pairs of diamonds, at the sixth he gives the kingdom of Mārō, and at the seventh that of Candērī; and when they pass the seventh gate, he has the King seized and carried off a prisoner (615).

Reflections of the poet. There are many waters in this world. Some men cross them and some sink. Some are blind, and cannot see the fire in the way, and others can see clearly and cleverly. To the King success became a disease, for he left heaven and fell down to earth. Why should he have trusted an enemy whom he had released after having him in his grasp,—and so on. A cruel lesson on imprudence is it to the King (616).

They load the King with fetters, and put him in a cage. The news reaches Citaur, and spreads over the country. Lamentation of the people. 'To-day the sun is set and Citaur is in darkness' (617). The cry is 'the Musalmān has conquered the Hindū.' The Emperor marches off with the King. The moral effect of the capture on the whole of India. All tremble, and become submissive to him. He returns to Delhi. All those who had rebelled, again submit (618). The cruelties of the King's imprisonment. He is taunted and beaten if he asks but for water. Burning, in want of water, he falls asleep, and wakes in the morning after dreaming of oceans (619). They continue taunting him about his disobedience, and tell him his only chance of success is to send for Padmāvatī if he wishes to escape (620). He gives no reply, and prepares for death. Description of his ill treatment (621).

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[1] I have given a more full translation of these three verses than usual, as they are of some importance for following the plot. The passage, as printed, is, however, very corrupt, and the details cannot be accepted as correct.

[2] A *caughaṛī*, is a silver or gold jewelled case in four (or more) compartments for holding cardamoms, otto of roses, cloves and the like, when presenting them to a guest.

Padmāvatī's anxiety about her husband's continued absence. She can get no news of him. Her sorrow (622). Her lamentations for her absent husband (623). The same continued (624). Nāgamatī's sorrow (625, 626, 627).

CANTO XXXIX.

KUMŌDINĪ.

Rājā Dēva Pāla of Kambhal'nēr,[1] a bitter enemy of Ratna Sēna, hears of his imprisonment, and determines to try and get Padmāvatī into his power. He sends for an old bawd named Kumōdinī, a Brāhmaṇī by caste, and gives her a betel *bīrā*,[2] telling her to go to Citaur and by force, or fraud, to bring Padmāvatī to him (628). She is ready to go, and boasts of the power of her charms and incantations (629). She fills a basket with cakes, and starts for Citaur (630). She arrives at Citaur, and after reciting her incantations goes into the palace, finds Padmāvatī's apartments, and takes the cakes to her. As she enters, she opens her arms, but Padmāvatī does not recognize her. Then she cries. 'Thou and I were born in the same town. My father's name was Bēnī Dūbē, Gandharva Sēna's private priest. When thou wast a child in Siṃhala Dvīpa, I used to give thee milk to drink. I have made a second home in Kambhal'nēr, and hearing that thou art in Citaur, I have come to see thee' (631). When Padmāvatī hears the name of her father's house, she falls on the old woman's neck and weeps. She laments fate. 'Why did my parents give me this unhappy lot by marrying me, and giving me a husband who hath been imprisoned? I wish to die, but my shameless life doth not abandon me' (632). Kumōdinī embraces her and weeps, and washes Padmāvatī's face. Consoles her. 'Who can wipe out what is written on the forehead?' Padmāvatī gives no reply, and remains unconsoled (633). Kumōdinī uncovers the trays of sweetmeats, but Padmāvatī will not eat them. She refuses even to touch them (634). Kumōdinī stays. She proffers further consolation. 'Thou art still a young lotus. Thou art still in thy tender youth. Why wear these unbeseeming weeds of sorrow. Adorn thyself. Sit upon thy throne, and sport. Enjoyment is but for a few days, and youth once gone doth not return' (635). Padmāvatī refuses comfort. 'She hath youth who is in the shadow of her husband's face. The jasmine of my body will take new shoots, when the lord of the house, its waterer, returneth. Till then it will remain withered' (636). Kumōdinī,—'Think not thus of life. As long as there is youth there are lovers. No husband is ever constant. Youth, like water, diminisheth day by day, and birds only seek the pond while it containeth water' (637). Padmāvatī,—'What is life and youth without a husband. She who is wedded to a lion desireth not a jackal. The true beauty is chastity. Siñ maketh the most lovely to be black' (638). Kumōdinī,—'Old age will come. It will then be too late for joy. Thy beauty will all disappear; now is the time for happiness' (639). Padmāvatī flames up. 'May her beauty be burnt up, who deserteth her own, and lusteth for another. Two kings cannot sit on one throne. Youth may go, and lovers may go, but not the memory of my husband's love. If we meet not in this world, we will meet hereafter. I am sinner enough as it is, for I still live' (640). Kumōdinī,—'No taste is appreciated till a new taste cometh on the tongue. Thou hast not learned the taste of another man. They only know the taste of the first, who have tried another. One sip of nectar filleth not the heart, till another hath been drunk' (641). Padmāvatī. 'Thou art my enemy, not my nurse: with inky words hast thou come to cheat me. Water is clean till ink falleth into it. The very moon would become black if defiled with such ink. Thou art insulting me with a smile upon thy mouth. My husband (*çyāma*)-lover is brilliant as the sun, other lovers are black (*çyāma*) as ink'[1] (642). Kumōdinī,—'Thou hast already black ink upon thee,—I see it in the blackness of thine eyes. Nay, black collyrium is adornment; so also is the black mole on the cheek. A line of ink giveth an enhanced charm. The pupils of the eye are black, and the whole world is seen by them, and so on. How can there be whiteness where there is no black? How can there be a body, when there is no reflection? Dēva Pāla is an all-powerful king. Thou wilt forget Citaur, when thou hast gone to Kambhal'nēr' (643). Padmāvatī bends her brows in wrath. 'Dēva Pāla is my husband's foe. How paltry is the bear compared to the lion; and, lo! a harlot is telling me a love-message from him. Were my lord here he would cut thy nose, and ears, and paint thy face black. He would shave thy head, and mount thee on an ass' (644).

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[1] See 540, Note [2].

[2] Offered to a person entrusted with a dangerous mission, and accepted by him or her.

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[1] So the printed editions. The original was probably a pun, or corrupted form of *svāmi* and *çyāma*.

CANTO XL.

The false Yōginī.

Padmāvatī founds a Dharma-çālā, in the hope of earning the release of the king. To every traveller who resorts to it, she gives food and water. From all she asks for news of her husband. The Emperor, hearing of this, sends for a harlot, clever in acting. He dresses her like a Yōginī, and sends her to Citaur with instructions to persuade Padmāvatī to become a Yōginī, and to bring her to Delhi. She arrives at Citaur, dressed as a Yōginī (645). She comes begging to the palace door. A maid-servant tells Padmāvatī of her. 'A Yōginī is at the door, and beggeth like one who hath lost a beloved. Though still in her first youth, she is living in austerity. She hath torn her veil and hath put on the beggar's blanket. She hath the ashes of separation, and matted hair, a skin over her shoulder, and a rosary round her neck. Her voice is wild, and her very footsteps burn the earth' (646). Padmāvatī calls her, and asks her whence she has come. 'Why art thou so distraught?' 'My beloved hath gone to a far country, and for him am I become a Yōginī. What are life and youth and body, when my love is gone? So I tore my veil and took the beggar's blanket. I wander everywhere and call for him. Though he dwelleth in my heart, he answereth not (647). I have wandered and wandered. I have gone to Banāras, to Gayā, to Jagannāth and Dwāraka, to Kedāranātha and Ayōdhyā (648), to Gaumukha, Haridwāra, Nagarakōṭa, the *Ṭīlā* of Bālanātha and Mathurā, to Suryakuṇḍa, Badarīnātha, Rāmanātha, Gomatī, Gurudwār, Sētubandha, Sumēru, Alakāpura (the city of Kuvēra), Brahmāvarta, Bēnī Saŋgama (*i. e.*, the Prayāga), Nīlakaṇṭha, Miçrikha, Kurajēta, and Gōrakshanātha. I went as far east as Patna, but found not my beloved (649). I wandered everywhere. I saw the Turks at Delhi, and the prisoners of the Emperor. Amongst them I saw one Ratna Sēna, exposed to the sun and denied all shade. I saw other kings prisoners there, who, seeing me to be a Yōginī, fell at my feet, (and implored me to release them). But what could I do. Delhi is not such an easy place. There is no escape from prison there. My body hath lost its soul in compassion at his suffering. How can she live whose husband is such a prisoner?' (650).

Padmāvatī learning that her husband is a prisoner, her grief is a hundred-fold intensified. It is like melted butter added to fire. She falls in horror at the Yōginī's feet. 'Let me have thy feet, that I may lay my eyes upon them. O, take me where my husband is! Show him to me as thou hast seen him, and I will give my life to thee as a sacrifice. I will give thee all the rewards of my chastity and religious virtue, if thou wilt only tell me of him. Thou art *Guru*, I am thy *cēlī*. I was wandering in error and thou hast shown me the way. Wait for me but for a moment, that I may dress as a Yōginī and go with thee.' Her maidens advise her to restrain herself. A Yōginī cannot divulge her *Guru's* instructions (651). The maidens (suspecting the falseness of the Yōginī, continue to her). 'Take alms Yōginī, and go.' Then, to Padmāvatī, 'Thou wilt not find thy love with such trivial deception. Remain at home till thy husband returneth. Let thy austerity be to remain at home. Instead of thy ascetic's vessel, wear thy modest veil, and for thy ascetic's horn, take thy sighs. For thy matted locks, bear the pangs of separation,' and so on. 'Before going with this woman, first seek advice from Gōrā and Bādal' (652).

CANTO XLI.

THE COUNSEL OF GŌRĀ AND BĀDAL.

Taking the advice of her maidens, she herself runs on foot to Gōrā[1] and Bādal's palace. The two heroes come out to meet her. She refuses to be seated. They ask her why she comes in such haste on foot and in public (653). Padmāvatī's tears. Her distraught condition (654). 'Ye, Gōrā and Bādal are two pillars. No one is brave in the battlefield like ye. The creeper of separation hath become a tree, and overshadoweth the earth. Let me become a Yōginī and run thither where my love is a prisoner. Let me be bound, and let me release him' (655).

Gōrā and Bādal are greatly distressed. Say they, 'We were vexed with the king and warned him against entering into treaty with the Turk.[2] Our suspicions have been realized, but as long as we have life we will not retreat, nor should'st thou become a Yōginī while thy husband liveth. Be of good cheer. The star Canopus[3] is risen, and the Hathiyā asterism roars. The waters abate, the king will surely return. The rains are over and Canopus appeareth. We will saddle and away. We will smite the demon of eclipse and release the sun, and no root or sprout of grief will remain' (656). Padmāvatī gives Gōrā and Bādal the betel, exclaiming, 'To what can I compare you? Ye are like Hanumān and Aṅgada, like Arjuna and Bhīma,' and so on. 'As Hanumān served Rāghava, so do ye the king; as Bhīma showed valour in the burning lac house, risking his life for others when he dragged the blazing beam, so do ye' (657). Ye are Rāma and Lakṣmaṇa, Drōṇa and Gāŋgēya,[1] Nakula and Sahadēva, Yudhiṣṭhira and Duryōdhana, Bhōja and Nala, Rāghava and Paraçu Rāma, Bharata and Çatrughna, opponents of Kaṁça and Cānura, Pradyumna and Aniruddha. Help me as Bhīma helped the Pāṇḍavas' (658). They take the betel, and tell Padmāvatī to call her litter and return home; she should not walk. She revives, and returns joyfully to her palace in a way consonant with her dignity (659).

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[1] Gōrā was Padmāvatī's uncle and Bādal her nephew.

[2] See 598.

[3] *I. e.*, Autumn, when Kings go out to fight. The '*Vikrama Kāla*.'

CANTO XLII.

The Departure of Gōrā and Bādal.

Yaçōdā, the mother of Bādal, comes and clasps his feet; saying, 'Thou art but a child, what knowest thou of battle? Mighty kings who opposed the Emperor could not protect Hammīra.' Description of the Emperor's power. 'Where great kings crash to ruin, what hast thou to do? To-day is the day for receiving thy bride home from her father's house. Remain at home and be happy' (660). Bādal,—'Mother, think not of me as a green boy. I am Bādal, the lion of battle. When a lion heareth a herd of elephants his soul is mightily moved, and his lion-racehood[2] cannot be hidden. I am ready to fight the Emperor alone. I would stand before a mad elephant unmoved, and tear its trunk and out-root its tusks. I will plant myself in the battle-field firm as Aŋgada. Consider me not as a child. Where'er the king is imprisoned, there will I enter and release him, even if it be hell' (661). As Bādal equips himself for battle, the marriage procession of Bādal's bride approaches. The bride appears, moonfaced, and brave in all her finery. Her beauty. She laments when she hears of her husband's departure; 'As I arrive at my husband's gate, he departeth to a distant land.' Her bridesmaids try in vain to console her (662). She casts aside her veil, and stands humbly at the door. She casts a piercing glance at Bādal and gathers up her raiment, but her husband looks another way and hardens his heart. Then she smiles and looks towards him, but he turns his back to her. Turning his face away he is wroth, 'I will not walk towards the woman's face.' The bride wonders at his ill-omened conduct. She is too modest to address him (663). Then she considers, 'I have not gained my love by my modesty, let me cast it aside and address him?' She smiles and catches his waist-band, saying, 'A husband should not refuse his wife's request. To-day I am come for the first time from my father's house, and thou, my love, art going to the battle. I have left my home but to meet thee; what leaving home is that, when my lord leaves me?

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[1] The grandfather of Bhīṣma.

[2] Rāj'pūts call themselves *Siṃha*, lion.

The bride hath not seen her beloved even one eye-full, and the beloved hath not yet met the bride once in his life. I am a lotus full of hope of union, and the bee who sippeth my nectar should not desert me. I lay my forehead at thy feet, (Hear me, my Lord), and, lo, now thy feet are bound in the tangles of my locks, so, how can'st thou leave me?' (664). Bādal,—'Lady, loose my waist-band. When a husband goeth forth to war, his wife should never grasp it. 'Tis true, fair lady, that for thee to-day is thy starting for thy new home, but for me it is the starting for where my king is in prison. Till my king return free, heroism alone fills my soul, not love. Women and land are hand-maidens of the sword, whoseso sword conquereth them, to him do they belong. In whoseso house the sword is pulled from the fist of the wielder, there is there no virile power, no moustache nor beard. On my face hair has come, let me play with life for a stake, and earn heaven in my master's service. The word of a man ne'er turneth backwards, e'en as the tooth of an elephant, once grown, doth not return into his mouth. Thou art but a girl, O lady, and understandest not. He who fighteth understandeth. A man whose heart is full of war, careth not for love.' (665). The bride replies,—'If thou would'st fight, I have made preparations for a love conflict. My bosom have I made the van, and the army of love in wrath is routing the troops of separation. My heroism is the vermilion on my brow, like the red blood on a naked sword. My brow is a bow, and mine eyes provide the arrows,' and so on. 'First fight with me and then think of war' (666). She is unsuccessful in her entreaties. She weeps, in vain (667).

CANTO XLIII.

THE TALE OF GŌRĀ AND BĀDAL.

Gōrā and Bādal consult together. They determine to meet deceit with deceit. They will deal with the Emperor as he has done with them (668). They prepare 1,600 covered litters, and fill them with knights. They prepare one special litter to represent that of Padmāvatī, in which sits concealed a smith. They adorn it, and surround it with maidens with waving chowries. They cover the litters with jewelled covers. They accompany the litters, proclaiming that Padmāvatī is travelling. 'The Queen is going to release the king, offering herself as a hostage. Thirty thousand horses is she taking, and sixteen hundred litters' (669).

Gōrā goes to the jailor in whose charge the king is. He gives him 10 lākhs of rupees as a bribe and flatters him. 'I supplicate the

Emperor. Padmāvatī is come, saying, "I am come humbly to Delhi with the keys of Citaur." She begs, that as she has the keys of the treasury with her, she may obtain permission to see the king for one hour, to make over the keys to him. She will then present herself to the Emperor in the palace.' The jailor, when he sees the bribe, becomes like water. Reflections on the effect on the moral character of taking bribes (670). Under the influence of the bribe the jailor omits to examine the litters. He goes to the Emperor, and says, 'O sun of the earth, the moon hath come, and all the planets and stars with her in 1,600 litters. Padmāvatī has come with the keys of the treasury of Citaur. She begs, with folded hands, that she may make them over to the king, for one hour. She begs that she may first see her husband, and then she will come into thy female apartments' (671). The Emperor gives the order to allow one hour's interview, and the royal litter goes in to the king with the others. The smith who is inside disguised as Padmāvatī gets out, cuts the king's fetters and makes obeisance. Fury rises in the king's heart as he is made free. He leaps on to a horse and roars like a lion. Gōrā and Bādal grasp their swords, and the other knights mounting their horses all stand ready. Each considers himself devoted to death and slays his thousands. News of the trick, and that they have cut their way out, is brought to the Emperor (672). They take the king off to Citaur. They are pursued by the Emperor with an immense army. Gōrā says to Bādal, 'One eclipse is over, another is about to commence. See the immense army.' Bādal replies, 'Do thou accompany the flight of the king, and I will stay behind and meet the Emperor's troops. I would play a game of polo with the Emperor, and do it alone. I will earn my name of Bādal, when I carry off the ball from the field' (673). Gōrā insists on Bādal accompanying the king, while he stays behind. He is old, what regret will there be for his death. He keeps a thousand knights with him, and sends the others with Bādal, and the King. He awaits with his thousand men, the onset of the Emperor (674). The game of polo begins in right earnest. Poetical comparison of the game of polo to the sport of a woman's love (675). Gōrā roars a challenge in the battle (676). The battle. The charge of Gōrā and his companions (677). The thousand knights are slaughtered one by one. Not one turns his bridle, all their wounds are in front; as one falls another presses forward to die in his place. Finally they are all killed, and Gōrā alone remains alive (678). Gōrā sees that all his companions are dead, and knows that his fate is at hand. He flings himself furiously into the battle, one against thousands, but does not die. He fights desperately. The Emperor orders him to be taken alive without delay, for Ratna Sēna is escaping (680). The Turks call upon him to surrender. He replies not. He looks upon his death as certain, and refuses to be taken alive. No one captures a lion alive. When he is dead they may drag him as they will. He is determined to cover Ratna's retreat (681). Sur'jā,[1] the wrestler, attacks him, with Mīr Ḥamza, 'Alī, Ayūb and Tāyā, the general who had conquered Landhaur. Gōrā is struck in the belly with a javelin, and as it is withdrawn his bowels fall out. A bard exclaims, 'Well done, Prince. Carry thy entrails on thy shoulder that thy horse may not tread on them'[2] (682). Gōrā cries, 'It is the end, I must fall to the earth. It is the end, and my head must roll in the dust.'—He rushes upon Sur'jā, who again wounds him with a javelin, while Gōrā strikes him with his sword. He strikes a second blow which Sur'jā receives on his shield, and a third which falls on his helmet (683). Sur'jā finally strikes a terrible blow and smashes Gōrā's head.[3] The portents which occur at Gōrā's death. Thus Gōrā dies, and the gods bring him water, while Bādal escorts the king safely to Citaur (684).

Padmāvatī's joy at hearing of her husband's release (685). The rejoicings when they meet. She worships his feet, and he kisses her head (686). Padmāvatī expresses her desire to sacrifice herself for him (687). Then she addresses Bādal and praises him (688). The King tells her the horrors of his imprisonment. His only consolation was the hope of meeting her again (689). Padmāvati tells the story of her sorrow (690).

CANTO XLIV.

THE TALE OF DĒVA PĀLA.

Padmāvatī continues,—'In addition to this I tell a thing that wringeth my soul. A cruel mountain of sorrow fell on me. Dēva Pāla sent a bawd, in disguise of a Brāhmaṇī, who came to me deceitfully. Her words were like poison to me. I restrained my five senses, and I repeatedly mortified myself' (691). When he hears the conduct of Dēva Pāla, a hard thorn falls into the heart of the King. He determines to seize Dēva Pāla before the Turk arrives at Citaur. He remains awake the whole night. Next morning he sets out to besiege Kambhal'nēr, a difficult fort to take. He has a terrible fight (692).

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[1] See 527.

[2] This refers to an old Rāj'pūt legend. The poet is hardly responsible for it.

[3] In the original the sound excellently re-echoes the sense.

CANTO XLV.

THE FIGHT WITH DĒVA PĀLA.

Dēva Pāla roars forth in the battle to Ratna, 'Let me and thee fight in single combat.' He strikes Ratna in the belly with a poisoned javelin, which pierces through his body and comes out at the back. Ratna himself strikes Dēva Pāla and cuts off his head. He then falls senseless, and loses his power of speech. He is brought home on a bed (693).

CANTO XLVI.

THE END OF THE KING.

The King dies, after making over charge of the fort to Bādal (694). Padmāvatī dons her silken *sāri* and goes forth with her beloved to the pyre. She adorns herself to become Satī (695).

CANTO XLVII.

THE SATĪ.

Both Nāgamatī and Padmāvatī become Satīs (696). They prepare the pyre, distribute alms, circumambulate seven times, and are burnt without contortion of a single limb (697).

While they are burning with their beloved the Emperor comes and besieges the fort. He hears the fate of Ratna and Padmāvatī and throwing a handful of ashes in the air, declares that all the world is illusion. His whole army does the same, and cries, 'Until this dust falls on our tombs, the desire of the world will not be satisfied.' Then they take the fort by assault, and Bādal dies fighting in the gate.

Before the Emperor's army takes it, the women of Citaur immolate themselves, and the men all die in battle. He destroys the city, and CITAUR BECAME ISLĀM (698).

'I asked the meaning of all this from learned men, and they told me that they understood it not. The fourteen continents are all in man's body. Citaur is the body, and the King is the soul. Siṃhaladvīpa is the heart, and Padmāvatī is wisdom. The parrot is the *Guru*, who showeth the right way, without whom the world is void of quality, and Nāgamatī is the cares of this world, and he is saved who is not caught by her. Rāghava, the pandar, is Satan, and 'Alāu'd-din, the Emperor, is illusion. So meditate on this love-story, and let him who can understand Turkish, Arabic, Hinduī, whatever languages there are, in whatever tongue the way of love is told, all praise it (699).

'I Muḥammad have collected and written this book. He who heareth it may gain the pangs of love. I collected and joined it with my heart's blood, and, with the love of love, mine eyes flowed tears. Knowing this did I compose my lay, that so a mark might remain of me in this world. *Where is now that Ratna Sēna, and where that wisdom-bearing parrot? Where is that 'Alāu'd-dīn the Emperor, and where that Rāghava who told him tales? Where is that lovely swan Padmāvatī? Naught of them hath remained, but their story. Happy is she whose fame is like unto hers. The flower may die, but its odour remaineth ever.*[1] Who hath not sold his fame in the world, and who hath not bought it? If a man read this lay and also remember me, he hath bought two-fold weight, (*i. e.*, he benefiteth himself and me) (700).

'Muḥammad, thou art old. Thy youth is gone. Thy strength is departed and thy body is lean. Thy sight is gone and thine eyes give naught but tears. Thy teeth are gone and thy cheeks are sunken. Thy tongue is stiff and thy words are halting. Thy wisdom is gone and people call thee mad. Thy pride is gone and thy head is bent. Thine ears are gone and thou only hearest those who speak loud. The blackness of thy locks is gone, and thy head shaketh. The black bee of thy locks is gone and hath left them grey. Thy youth hath won the game and carried it off for its prize. As long as there is life, youth remaineth, but when death comes, it becometh another's.

'When an old man noddeth his head, it shaketh in anger on that account (that his youth is gone). Who was it that blessed me and wished that I might live to (forsooth) a good old age?' (701).

APPENDIX I.

List of Flowers and Trees.

In several passages Malik Muḥammad gives long lists of names of flowering plants and of trees. Their identification has been difficult, the ordinary dictionaries having been found to be untrustworthy guides. The following is a list of most of the names which occur. The spelling of the vernacular words is only provisional, pending the fixing of a correct text.

I know nothing of botany myself, and must express my acknowledgments to Dr. Prain, of the Botanical Gardens, Sibpur, for the identifications given. The list will be found useful by future lexicographers. Many of the plants named are little known, and a convenient list giving the scientific nomenclature authoritatively has long been wanted.

Ãjīrī, the common Fig, Ficus carica, *L.*

Amṛita bēlī, (?) the Black Currant, Ribes nigrum, *L.*

Ā̃una, ? *Ā̃olā*, the Emblic Myrabolan, Phyllanthus emblica, *L.*

Ā̃ba, or *āma*, the Mango, Mangifera Indica, *L.*

Āma, see *Ā̃ba.*

Imilī, the Tamarind, Tamarindus Indica, *L.*

Kaṭahari, the Jack-fruit, Artocarpus integrifolia, *L.*

Kadamba, the Kuddum, Anthocephalus cadamba, *Miq.*

Kamarakha, the Averrhoa, Averhoa carambola, *L.*

Karaũdā see *Rāi-karaũdā.*

Karanā, the Citron, Citrus medica, *L.*, var. acida, *Brandis*, C. acida, *Roxb.*

Kiśimisa, the Grape Vine, Vitis vinifera, *L.* The same as *dākha.* A Persian form.

Kunda, the Indian Jasmine, Jasminum pubescens, *Willd.*

Kūjā, a kind of Rose, Rosa Brunoniana, *Lindl.*

Keorā, see *kētakī.*

Kētakī, or *keorā*, The Fragrant Screw-pine. Pandanus odoratissimus, *L.*

Kērā, the Plantain, Musa paradisiaca, *L.*

Kēsara, the Safflower, Crocus sativus, *L.*

Khajūra, the Date-palm, Phœnix sylvestris, *L.*

Khiranī, the Mimusops hexandra, *Roxb.*

Khuruhurī, the *Khurhur*, Ficus cunia, *Ham.*

Galagala, the Elephant Lemon, or Kumaon Lemon, *Citrus Limonum*, *L.*

Gulāla, the common Basil, see below. Ocimum Basilicum, *L.*

Guā, the Areca-nut palm, Areca catechu, *L.* Roxburgh says this is the Bengali name of *supārī.*

Camēlī, the Arabian Jasmine, Jasminum sambac, *Ait.*

Campā, the Champak, Michelia champaca, *L.*

Ciraũjī, Buchanania latifolia, *Roxb.* Its kernels are used instead of the *dēsī bādāma.*

Chohārā, the Date-palm, Phœnix dactylifera, *L.*

Jābhirī, the Orange Citron, Citrus medica, *L. var.*

Jāiphara, the Nutmeg, Myristica officinalis, *L. fil.*

Jāmuna, the Black Wild Plum, Eugenia jambolana, *L.*

Jāhī, the Spanish Jasmine. Jasminum grandiflorum. *L.*

Jūhī, a variety of Indian Jasmine, Jasminum auriculatum, *Vahl.*

Tāra, the Palmyra Palm, Borassus flabelliformis, *L.*

Turuñja, the Citron proper, Citrus medica, *L.*

Tūti, the Mulberry, Morus Indica, *L.*

Dākha, the Grape Vine, the Hindi name of *Kisimisa*, Vitis vinifera, *L.*

Dāriũ, or *dārima*, the Pomegranate, Punica granatum, *L.*

Nariara, the Cocoanut, Cocos nucifera, *L.*

Nāgēsara, the Rose Chesnut, Mesua ferrea, *L.*

Nārāga, the Orange, Citrus aurantium, *L.*

Nimbu, see *Nĩu*.

Nĩu, or *nimbu*, the Sour Lime, Citrus acida, *Roxb.*

Newañjī or *nyañjī*, the Red Currant, Ribes rubrum, *L.* The name is only known in Láhúl now-a-days.

Nyañjī, see *Newañjī*.

Bakaurī, the Abelia, Abelia triflora, *Br.* Most of the species are Japanese and Chinese. This one is found in the N.-W. Himālaya.

Baḍahari, the Baṛhal, Artocarpus lakoocha, *Roxb.*

Badāma, the almond, not the *Terminalia catappa*, but the *Prunus Amygdalus*, *Baill.*

Bēri or *baira*, the Jujube, Zizyphus jujuba, *L.*

Bolasari, see *mōlasari*.

Mahuā, the Mahoowa tree, Bassia latifolia, *Roxb.*

Mālatī, the Clove-scented Aganosma, Aganosma caryophyllata, *Don.*

Mōlasari or *Bolasari*, the Mimusops elengi, *Linn.*

Rāi-karaũdā, the Corinda, Carissa carandas, *L.*

Rasa bēlī, the Wax-plant, or Honey-plant, Hoya lanceolata, *Wall.*

Saŋkhadrāu, Sorrel, Rumex vesicarius, *L.*

Satibaraga or *Sadabaraga*, the Marigold, Calendula officinalis, *L.*

Siŋgārahāra, the Weeping Nyctanthes. Nyctanthes arbor-tristis, *L.*

Sudarasana, the Rose-apple, Eugenia jambos, *L.*

Supārī, see *Guā*, the Areca-nut palm, Areca catechu, *L.*

Seotī, the Dog-rose, Rosa glandulifera, *Roxb.*

Sēu, the apple, Pyrus malus, *L.*

Sōnijarada, the Oleaster or Wild Olive, Elaeagnus conferta, *Roxb.*

Haripharyaurī, the Indian Gooseberry, Rhodomyrtus tomentosa, *Wight.*

Dr. Prain continues :—

'By the bye, the majority of the names have a Pañjābī ring about them, and most of the plants that are not natives of the N.-W. Provinces are ones that come from the West (Pañjāb to Persia), or that come from the Kumoān Hills, rather low down.

'Thus, taking the flowers—

'The *kadamba*, *karanā*, *kunda*, *campā*, *jūhī*, *mālatī*, *siŋgārahāra*, and *sudarasana* might be natives of the writer's country. (But the *kadamba* may have been introduced from the Lower Provinces.)

'The *kēsara*, *camēlī*, *jāhī*, *satibaraga*, are Western plants introduced before his time to Oude. (The *jāhī* may also be from Kumāon).

'The *kadamba*, *kētakī*, *nāgēsara*, *mōlasari* (perhaps), must have been introduced from the eastward by way of the Lower Provinces.

'The *jāhī* (see however note above), *kūjā*, *bakauri*, *rasa-bēlī*, *seotī*, and *sōnijarada* are natives of N.-W. Himālaya, and, except the *jāhī*, which also comes from Afghānistān and Persiā and can stand a deal of heat, can hardly have been known to him, unless he was in the habit of going some way into the hills, for I do not feel sure that they could have been grown in the plains. At any rate, if he could grow them below, they *came originally from the hills* of Kumāon or Kāshmīr.'

In another communication regarding the trees, Dr Prain writes: 'The names of the oranges and lemons are interesting and fall in exactly with those known to Bonavia, in the very country in which the poet wrote.

'You will note again the very marked Pañjābī and Himalayan ring about the names, *e.g.*, in the red currant, with a regular Hill name. In this case, I think that the *amṛita bēlī*[1] must be the *black* currant. I cannot think why the author gives (in the same passage) the two names, *supārī* and *guā*, of the betel-nut. They mean exactly the same now-a-days. The name for sorrel[2] I do not find in any of our books, I give, however, the Latin name of sorrel. The Indian gooseberry[3] has not any name quoted so far as my reading goes. I give its Latin name also. *It* is an exception to the rest of his fruits, for it comes from South India and Ceylon, (the only thing that is restricted to these parts in his whole list.)

'*Gulāla* is the common basil of old-fashioned English gardens. The name is usually given, not to the green-leaved plant we know, but, to a purple-leaved form that one gets in India. By the way, the plant is generally spoken of as *gulāl tulsī*, so that the word is used as an adjective. Our basils are, of course, the Indian *tulsīs*, but, owing to our and their interest centering on different ones, they give their name, *unqualified*, to a different one from the one that is unqualified by us. Thus:—

English name.	*Scientific name.*	*Indian name.*
THE BASIL.	Ocimum basilicum.	Gulāl tulsī.
Sacred Basil.	Ocimum sanctum.	TULSĪ.
Sweet Basil.	Ocimum gratissimum.	Rām tulsī.

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[1] *Bēlī* is the Pañjābī name for the black currant.

[2] *Saŋkhadarāu*, which I had identified with the Sanskrit *Śaŋkhadrava*, which the dictionaries translate by 'sorrel.' G. A. G.

[3] *Haripharyauri*, translated in all dictionaries by 'Indian Gooseberry.' G. A. G.

APPENDIX II.

LIST OF BIRDS.

The poet also gives (stanza 29) a long list of birds. Unfortunately I know even less about them than I do about botany. I accordingly applied to an acknowledged authority, Dr. Scully. The following is condensed from the information which he very kindly gave me, together with what I have been able to make out from inquiries from natives.

Kāga, the Indian Crow, *Corvus splendens*, Viellot.

Kōila, the Indian Cuckoo, *Eudynamys honorata*, L. According to the poet, its cry is '*kuhū, kuhū.*'

Guḍurū. An Urdū glossary translates this by *pōdanā*, the Smaller Skulking Warbler, which Forbes says is *Sylvia olivacea.* Its cry is '*tuhī̃, tuhī̃.*'

Papīhā. Dictionaries call this the Sparrow-hawk, which is wrong. It is the Hawk-cuckoo, *Hierocсyx varius*, Vahl. It is a true cuckoo and not related to the sparrow-hawk. The poet says its cry is '*piu, piu*' (beloved, beloved). The ordinary native tradition is, that it says '*pī kahā*' (where is my love?) It is the 'Brain-fever Bird' of Anglo-Indians.

Parēwā, the Blue Rock Pigeon, *Columba intermedia*, Strickland.

Pāṇḍuki, a sort of family name for many species of doves. We may perhaps consider that the particular species intended is the Indian turtle dove, *Turtur meena*, Sykes. Its cry is 'a single *tūhī.*'

Bhī̃garāja, or *Bhīmarāja.* The dictionaries wrongly call it a Shrike. It is the Racket-tailed Drongo, *Dissemurus paradiseus*, L. Sanskṛit *Bhṛiṅga-rāja.* It is a sort of King-crow. As the poet says, 'It speaks many languages.' It is an excellent talker.

Mahari, not identified. Its cry is *dahī, dahī.*

Mōra, the peacock, *Pavo cristatus*, L.

Sārō, not identified. Forbes gives *sārū*, a kind of bird, a species of black-bird. In the poem it is coupled with the *suā* or parroquet. The cry of both is said to be *raha-caha*, which seems to mean twittering.

Suā, see *sārō.* It is a Parrot or Parroquet. Dr. Scully says, 'In the absence of evidence tending to fix the particular species, we may take the commonest species, *viz.*, the rose-ringed parroquet, *Palæornis torquatus*, Bodd.'

Harēwā, a v. l. for *parēwā*, above, the Gold-fronted Green Bulbul, *Phyllornis aurifrons*, Temm. It is a well-known cage-bird and a beautiful songster.

Hārila, the green pigeon, *Crocopus phœnicopterus*, Latham.

Study of Sanskrit in Ceylon—*By* PANDIT HARI MOHAN VIDYÁBHÚSHAṆ.

The island of Ceylon has been known to us from very early times: first, as a fabulous country inhabited by a class of men called Rákshasas, who, though civilised in arts and sciences, were yet rude in their habits of life; secondly, as a country of precious stones during the Buddhistic period; and lastly as a country occupied by a large colony from the city of Siṃhapura in Western Bengal, then called Ráḍha. But after the Arabs, the Portuguese and the Dutch came to trade in the East, and became the lords of the Indian Seas, the Bengalese who used to go to Ceylon, embarking at the ancient port of Támraliptí, the modern Támluk, ceased to make sea-voyages.

It is owing to this fact, that, at present, communication between Ceylon and Bengal has become a thing of the past. With the exception of a few natives of India who happen to visit Colombo on their way to Europe, the people of this country know very little of Ceylon.

At a time when the spirit of adventure awakened the dormant energy of the Indian people to action, and when the barriers raised by Hinduism against sea-voyages were removed by the enlightened spirit of Buddhism, thousands of barks used to sail from Támraliptí to the shores of Ceylon, (*i. e.*, Támraparṇí or Támraveṇí of the ancients). It was through the efforts of those merchants that the fame of the mineral wealth of Ceylon became known to the Romans and the Greeks, who had intercourse with the empire of Magadha. More than two centuries before Alexander's conquests in the East, Indian merchants from S'rávastí, the ancient capital of Oudh, used to visit Ceylon, evidence of which is now coming to light from the sacred books of the Buddhists, preserved in the Archives of the Dalai Lama at Lhasa.

Besides what can be gathered from Tibetan sources, something can be gleaned from the Kalpalatá, the Ratnamálá, and other Sanskrit works lately recovered from Tibet by Bábú S'arat Chandra Dás.

The story of Muktálatá, which has been published in the Bibliotheca Indica Series contains the following:—

ततः कदाचिद्वणिजः श्रावस्तीपुरवासिनः ।
मकराकरमुत्तीर्य्य सिंहलद्वीपमाययुः ॥

* * * * *

कालेन सिन्धुमुत्तीर्य्य सम्प्राप्तास्ते निजां पुरिम् ।
प्रणम्यावेद्य तद्वृत्तं ददुर्लेखं महात्मने ॥

i. e., "Some time afterwards native merchants from S'rávastí crossed over the sea and reached the island of Ceylon. Having resided there for some time they crossed the sea again and reached their native town; and after bowing before their Lord they gave him an account of her (*i. e.*, the princess') behaviour and handed over her letter to Him."

Mr. James D'Alwis, in his preface to the descriptive catalogue of Sanskrit, Páli, and Singhalese literary works, observes:—"If the Orient pearls for which Ceylon has been famed from all antiquity, are still highly prized amongst the nations of the world, the intellectual pearls which Oriental scholars of many nations will be enabled to gather from Laṅká's store-house of Literature, will not be esteemed as less precious or valuable." This remarkable passage struck me very much when I glanced over the pages of his catalogue. Being a Bráhman, I did not attach much value to the numerous Páli and Singhalese Buddhist works which have been enumerated in it, nor did I wonder at the mineral wealth and pearls which Ceylon possessed in olden times. What struck me most was the account of the study of Sanskrit which prevailed in Ceylon during the early centuries of the Christian era.

So early as the fifth century the study of Sanskrit was considered essential for all those who passed for literati in Ceylon, and Sanskrit scholars were respected side by side with the professors of Páli, the sacred language of the Buddhists. We are told in the Mahávaṃśa that Brahmanism flourished in Ceylon for about ten centuries, till 1000 A. D. This statement is borne out by facts and also by the Sanskrit works which were written by Singhalese authors. It is also very interesting to note that while the nine gems, called *nava ratna*, adorned the court of Vikramáditya during the 6th century A. D., the Augustan age of India, there should have been a king on the throne of Ceylon, who in scholarship in Sanskrit and in versification was not less gifted than the son of Sarasvatí—the immortal Kálidása.

The fame of Kumáradása as a poet had spread far and wide, and Kálidása who had read one of his productions—the "Jánakí-haraṇa"—was so much struck with the true poetic genius of the Royal Poet of Laṅká that he was induced to make a journey to Ceylon to meet him.

Oriental scholars have not yet been able to gather sufficient chronological information about the age of Kálidása to enable us to enter into a discussion on the subject. There are so many conflicting statements as to his date, that one is apt to be bewildered by them. There is a tradition in Bengal that he died in the house of a courtezan. This statement, whether true or false, is borne out by a tradition which can be gathered from Singhalese works. The learned Bhikshu Dharmáráma, in the preface to his edition of the "Jánakí-haraṇa," gives prominence to this account. It is said that Kálidása struck with the wonderful poetic genius of Kumáradása, undertook a long and tedious journey from Central India to meet the royal bard in his native land.

"Kumáradása who was a profound Sanskrit scholar and poet reigned nine years, and ended his life by throwing himself into the funeral pile of his friend Kálidása." The following lines from the Singhalese work called "Perakumbásirita" fully corroborate the above statement and further record the very high merits of the king as a poet:—

Ejara Kiviyara pinin Jánaki-haraṇaé mahakavbendi,
Kumaradas rada Kálidas nam Kivindu Haṭa Siya divipídi.

i.e., "The king Kumáradása who with immortal poetic felicity composed the Jánaki-haraṇa and other great epics, sacrificed his life for the great Kálidása."

An episode so interesting for the light it throws on the lives of Kumáradása and Kálidása demands our attention. The Singhalese story in brief is this:—

The king was in the habit of frequenting the house of a woman to whom he was attached. On one of these visits he wrote on the wall the two lines—

Padmát padmaṁ samudbhútam
S'rúyate na cha dṛiśyate.

i. e., "It is heard, but not seen, that a lotus flower is produced from another lotus flower."

Under them he wrote a line offering a reward to the person who should complete the verse. Kálidása, then on a visit to the great royal bard whose poem he had seen in India, took lodgings that evening, as chance would have it, in the same house, and happening to see the lines on the wall, completed the verse by adding,—

Bálé tava mukhámbhoját
Tvannetrendívaradvayam.

i. e., "O Maiden! from the lotus of thy face have sprung up the two blue lilies of thine eyes."

The woman to whom perhaps the poet meant the lines as a compliment, influenced by the hope of obtaining the promised reward, murdered Kálidása that night and hid his body.

When the king visited her the following morning, she demanded the reward as the writer of the couplet. But Kumáradása, detecting in them the genius of a true poet, would not believe her, but insisted on her disclosing the real author. On being threatened, the murderess confessed her crime. When the corpse of Kálidása was brought out, the king's sorrow and consternation knew no bounds. He ordered a grand funeral in honour of the renowned poet. When the pile was lighted, the generous-hearted monarch, overwhelmed with sorrow, sprang into the fire and was soon consumed by the flames together with his brother bard. Five queens of the king instantly followed his example. According to the Singhalese custom, seven monuments were erected, and seven bô-trees planted on the spot of the cremation. This sad event appears to have happened at Mátara (or Mahátirtha), where the king is said to have resided at the time.

Within the town there is a place by the name of "Hat Bódiwata" (**सप्तबोधिवट**—the garden of seven bô-trees), which tradition points out as the scene of this tragedy.

In India a similar tradition prevails regarding Kálidása, who is said to have written the following verse :—

कुसुमे कुसुमोत्पत्तिः श्रूयते न च दृश्यते ।
बाले तव मुखाम्भोजे कथमिन्दीवरद्वयम् ॥

i. e., "It is a mere hearsay statement, that flower begets flower, but no one has realized (the truth of it) by actually seeing it. O Maiden, how is it that I see two lilies on your lotus-face ?"

It is curious that the traditions that prevailed in both countries should be substantially the same, though expressed in different words. Of the two, the Indian *śloka* is decidedly the better.

Some Oriental scholars have conjectured the date of Kálidása to be in the 6th century. That Kumáradása was a king of Ceylon in the 6th century is a historical fact, as can be gathered from the Mahávaṃśa, therefore it is not improbable that the great Indian poet Kálidása was a contemporary of Kumáradása.

It is to be regretted that the original works of Kumáradása should have been lost. But quotations from his Jánakí-haraṇa are to be found in Patañjali's Mahábháshya, in Rájaśekhara's work, in Ujjaladatta's Uṇádi Vṛitti, and also in Kshemendra's Auchityálaṅkára. Prof. Peterson, in his paper "On the Auchityálaṅkára of Kshemendra, with a note on the date of Patañjali," made the following remarks :—

"कुमारदासस्य—

अयि विजहीहि दृढोपगूहनं त्यज नवसङ्गमभीरुवल्लभं ।
अरुणकरोद्गम एष वर्त्तते वरतनु संप्रवदन्ति कुक्कुटाः ॥

(Kshemendra's Auchityálaṅkára.)

i. e., "By Kumáradása—

O, give up the firm (warm) embrace and leave the lover who is timid at this first union. O beauteous Maiden! the rays of the rising sun are appearing and the cocks are crowing."

"The discovery that Kshemendra quotes this verse and assigns it to Kumáradása will one day, I hope, prove a valuable datum for the Mahábháshya itself. Unfortunately we do not yet know Kumáradása's own date. But the following verses by him are quoted here, as, with the present example, presenting strong internal evidence that a writer who quotes Kumáradása cannot have lived at the date now widely accepted for Patanjali."

Prof. Peterson again published the following note in the *Academy* for the year 1885, page 277:—"I have lately come across a date for Kumáradása and the name of his book. In Jalhana's 'Súkti Muktávali' the following verse of Rájaśekhara's treats of this poet:—

जानकीहरणं कर्तुं रघुवंशे स्थिते सति ।
कविः कुमारदासश्च रावणश्च यदि क्षमः ॥

"*i. e.*, 'The poet Kumáradása and Rávaṇa, if any, are the only persons who can achieve the *Jánakí-haraṇa* (or Rape of Sítá) in the face of the Raghuvaṃśa (or unawed by the dynasty of Raghu).'

"It is clear from this that Kumáradása wrote his 'Jánakí-haraṇam' *after Kálidása.*"

I think, by writing 'after Kálidása,' Prof. Peterson meant after the "Raghu-Vaṃśa," for it is only stated in the above śloka that Kumáradása's "Jánakí-haraṇa" was a later production than the "Raghu-Vaṃśa." But it does not necessarily follow that Kumáradása flourished after Kálidása.

The 'Pada-Chandriká,' by Ráya-Mukuṭa, a commentary on the Amarakosha, which is a work of the 15th century, has numerous quotations from Kumáradása's "Jánakí-haraṇa." This shows that the work was largely used in India during the 15th century.

We are told by the Singhalese historians that about the 14th century certain Dravidian kings conquered Ceylon and exterminated all the Sanskrit and Páli works of that island; so much so that the Singhalese, after the downfall of this dynasty, had to bring all the sacred books from Burmah. It seems that Kumáradása's works were also destroyed at that time in Ceylon. But as the Jánakí-haraṇa was extant in India up to the 15th century, we may hope that it will, some day, be discovered by the Paṇḍits who are now engaged in collecting Sanskrit Manuscripts under the auspices of the Government.

In 1870 Mr. James D'Alwis, who was entrusted with the work of searching for Sanskrit and Páli manuscripts in Ceylon, discovered a manuscript of the Singhalese *Sanna*, *i. e.*, a literal translation of the work, the "Jánakí-haraṇa." Being himself a great scholar, he was able to appreciate its excellence. He caused a Paṇḍit to restore ten verses of the work from the said *sanna*, or Singhalese commentary.

I here quote his remarks on the poem: "The Jánakí-haraṇa is a very ancient and very interesting Sanskrit poem. A Singhalese *Sanna*, or literal translation of it, alone has been discovered. It is, however, possible that the original work may still be found in some nook of an old monastic library. Like all Singhalese *Sannas*, this translation quotes the words of the original in their integrity, and it is therefore not impossible to restore the words to their original poetical form; though, we confess, the manuscript in our possession requires much correction after comparison with other copies, which, we hope, may yet be found. But its restoration into metre is undoubtedly a very arduous work. Considering, however, that this poem, according to the opinion of the learned in Ceylon, is 'not inferior to the works of Kálidása,' the Indian Shakespeare, and that it may be ranked amongst the Mahákávyas, or great poems, it may be well worth the trouble of some Oriental scholar in Europe to undertake the work of restoration."

I am glad to notice here that recently Bhikshu Dharmaráma, the learned Principal of the Vidyálaṅkára Oriental College, Ceylon, has done great service to Oriental scholarship by restoring Kumáradása's Jánaki-haraṇa into metre from the Singhalese literal paraphrase. He has collected several manuscripts of the *sanna*, and has built an edifice with the material contained in them—which, I may hope, will be found to resemble its prototype—the lost Jánakí-haraṇa, if found out in future. Had Mr. D'Alwis been living now, how glad he would have been to see the realization of his hopes about the work in the labours of Bhikshu Dharmaráma—twenty years later.

To enable us to form an estimate of the comparative value of the restored verses, I subjoin a transcription in Devanágarí of the first 10 verses of the Canto IX from the present edition, side by side with those restored by Mr. D'Alwis. (See Appendix I.)

From a careful examination of the above it will be seen that the spirit of the verses given by Dharmaráma and D'Alwis is the same, though a slight alteration in the arrangement of the lines may be noticed here and there.

The occasional deviation of Dharmaráma's ślokas from those given by Mr. D'Alwis is due to the use of synonymous words. This is chiefly due to the fact that Dharmaráma had access to more correct and trustworthy manuscripts than Mr. D'Alwis had access to twenty years ago. It is also to be noted that he took greater pains than Mr. D'Alwis, as he had gleaned materials from different sources with a view to publish the complete work of the "Jánakí-haraṇa." Mr. D'Alwis had frankly confessed his inability to procure further materials, and so he was content with restoring to us only ten verses of the entire work.

It is a pity that Bhikshu Dharmáráma should have thought it fit to publish his edition of the Jánakí-haraṇa in the Singhalese character, which is not intelligible to many of us. I believe, if the production were transliterated into Roman or Devanágarí character, it would be sure to receive the recognition it deserves at the hands of many Oriental scholars.

I beg to submit the first forty-two verses of Canto I, which I have transliterated into the Devanágarí character. I rejoice to say that, in my humble opinion, true signs of poetic genius can be seen from the verses I have already transliterated.* (See Appendix II.)

APPENDIX I.

VERSES RESTORED BY BHIKSHU DHARMÁRÁMA.

CANTO IX.

इति प्रवृत्तस्य सुतस्य केषुचित् गतेषु मासेषु सुखेन भूपतिः ।
पुरं प्रतस्थे वनितापरिग्रहैः त्रयं सुतानामितरत् समर्प्य सः ॥ १
कलत्र-भारेण च शोक-सम्पदा पदद्वयं मन्थरविक्रमा पितुः ।
ततान पत्याङ्घ्रिरुपेत्य विन्दुभिर्दृशोः प्रयाणाभिमुखी भुवः सुता ॥ २
गुरुस्ततोऽसौ गुणपक्षवर्त्तिनीं मतिं समालम्ब्य गुणैः पुरस्कृताम् ।
अपत्यकां साधु जगौ गरीयसीं गिरं सतीनामुचितव्रताश्रयाम् ॥ ३
परं प्रकर्षो वपुषः समुन्नतिर्गुणस्य तातो नृपतिर्नवं वयः ।
इति स्म मा मानिनि मानमागमः पतिप्रसादोन्नतयो हि योषितः ॥ ४
स्त्रियो न पुंसामुदयस्य साधनं त एव तद्धामविभूति-हेतवः ।
तड़िद्वियुक्तोऽपि घनः प्रजृम्भते विना न मेघं विलसन्ति विद्युतः ॥ ५
गतापि भर्त्रे परिकोपमायतं गिरोऽन्यथा मा परुषार्थदीपनीः ।
वदन्ति मौनं हि परं प्रसादनं कुलस्त्रियो भर्त्तृजनस्य भर्त्सने ॥ ६
पतिव्रता वश्यमवश्यमङ्गना करोति शीलेन गुणस्पृहं पतिम् ।
विनष्ट-चारित्र-गुणा गुणैषिणः पराभवं भर्त्तुरुपैति दुस्तरम् ॥ ७

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* [On Dharmáráma's edition of the "Jánakí-haraṇa," see Professor E. Leumann's review in the *Vienna Oriental Journal*, vol. VII, p. 226. Ed.]

अलं त्वयि व्याहृतिविस्तरेण मे कुरुष्व तत् यच्चरितं त्वदाश्रयम् ।
श्रुतिं प्रयातं जरसैव जर्ज्जरं सहस्रधेदं हृदयं न दारयेत् ॥ ८
अयं त्वदेकप्रवणो मनोरथो वृथाद्य दैवादपि नाम नो भवेत् ।
इति प्रवक्तुर्जरतो निरासिरे निगृह्य कण्ठं वचनानि मन्युना ॥ ९
उदग्रभासः शिखया शिखा-मणेः स्रजा च धम्मिल्लकिरीटदष्टया ।
प्रमृज्य पादौ जनकस्य जम्पती व्ययादयातामथ लम्भिताशिषौ ॥ १०

CANTO IX.

VERSES RESTORED BY MR. D'ALWIS.

इति प्रवृत्तस्य सुतस्य केषुचित् गतेषु मासेषु सुखेन भूपतिः ।
चयं सुतानामितरत् समर्प्य सः पुरं प्रतस्थे वनिता-परिग्रहैः ॥ १
नितम्बभारेण च शोकसम्पदा भुवः सुता मन्थरविक्रमा पितुः ।
ततान पादावुदविन्दुभिर्दृशोरुपेत्य पत्याभिमुखी प्रवृत्तये ॥ २
गुरुस्ततोऽसौ गुणपक्षवर्त्तिनीं मतिं समालम्ब्य गुणैः पुरस्कृताम् ।
अपत्यकां साधु गिरं गरीयसीं जगौ सतीनामुचितव्रताश्रयाम् ॥ ३
परं प्रकर्षो वपुषः समुन्नतिः गुणस्य तातो नृपतिर्वयो नवम् ।
इति स्म मा मानिनि मानमागाः पतिप्रसादोन्नतयो हि योषितः ॥ ४
स्त्रियो न पुंसामुदयस्य साधनं त एव तद्धामविभूति-हेतवः ।
तडिद्वियुक्तोऽपि घनः प्रजृम्भते विना न मेघं विलसन्ति विद्युतः ॥ ५
गिरोऽक्तथा मा परुषार्थदीपनीः गतापि भर्त्रे परिकोपमायतम् ।
कुलस्त्रियो भर्त्तृजनस्य भर्त्सने वदन्ति मौनं हि परं प्रसाधनम् ॥ ६
पतिव्रता वश्यमवश्यमङ्गना करोति शीलेन गुणस्पृहं पतिम् ।
विनष्ट-चारित्र-गुणा गुणैषिणः पराभवं भर्त्तुरुपैति दुस्तरम् ॥ ७
अलं त्वयि व्याहृति-विस्तरेण मे श्रुतिं प्रयातं चरितं त्वदाश्रयम् ।
न दीरयेद् यज् जरसैव जर्ज्जरं सहस्रधेदं हृदयं कुरुष्व तत् ॥ ८
अयं त्वदेकप्रवणो मनोरथो वृथाद्य दैवादपि नाम नो भवेत् ।
इति प्रवक्तुर्वचनानि मन्युना निगृह्य कण्ठे जरतो निरासिरे ॥ ९
उदग्रभासः शिखया शिखामणेः स्रजा च धम्मिल्लकिरीटदष्टया ।
प्रमृज्य पादौ जनकस्य जम्पती व्ययादयातामथ लम्भिताशिषौ ॥ १०

CANTO IX.

Translation.

1. Thus when his (eldest) son had happily spent a few months, the king got his three remaining sons married and started for his capital.

2. (The Princess) born of the earth, when about to start in the company of her husband, touched in reverence with tearful eyes the feet of her father. Her steps were graceful and slow owing to the heaviness of her heart (at the prospect of separation) and also to that of her limbs.

3. Then her father addressed his accomplished daughter in language which was (at once) instructive and also befitting the vows of purity in the fair sex; so that she might always abide in virtue.

4. "O my daughter, being possessed of extraordinary self-respect, do not be proud of your personal charms, your high accomplishments, your royal parentage, or of your budding youth; for the welfare of the female sex consists in the love of their husbands.

5. "The wordly success of men is not due to woman. But men are the source of the good fortune and prosperity of their wives. For there cannot be lightning without clouds, though the clouds appear charming when there is no lightning.

6. "Even when you become angry, do not use a strong word to your husband. It is said that silence is the best resource of a noble wife when she is reproved by her husband.

7. "A wife devoted to her husband by her chastity, charms a good husband. A wife who has abandoned a virtuous life, incurs the irredeemable displeasure of a virtue-loving husband.

8. "Your behaviour should be good, so that when it reaches my ear, my heart which is sore and infirm with age, may not be pained in a thousand parts.

9. "Let not this cherished hope of mine, which is centred in you, even by chance end in nothing." When the old man expressed himself in this manner, sorrow choked his throat and he could not speak any more.

10. The couple at last set out from their father's home, having bowed their head to the feet of king Janaka. The wreaths of flowers which adorned the crown of the bridegroom which was topped with glittering gems, and also the dressed locks of the bride now covered the feet of king Janaka.

APPENDIX II.

जानकी-हरणम् ।

CANTO I.

आसीदवन्यामतिभोगभाराद्दिवोऽवतीर्णा नगरीव दिव्या ।
क्षत्रानलस्थानशमी समृद्ध्या पुरामयोध्येति पुरी परार्द्ध्या ॥ १
यत्-सौध-शृङ्गाग्र-सरोज-राग-रत्नप्रभाविच्छुरितः शशाङ्कः ।
पौराङ्गनावक्त्र-कृतावमानो जगाम रोषादिव लोहितत्वम् ॥ २
कृत्वापि सर्वस्य मुदं समृद्ध्या हर्षाय नाभूदभिसारिकाणाम् ।
निशासु या काञ्चन-तोरणस्थरत्नांशुभिर्भिन्न-तमिस्र-राशिः ॥ ३
चीनांशुकैरभ्रलिहामुदग्र-शृङ्गाग्रभागोपहितैर्गृहाणाम् ।
विटङ्ककोटिस्खलितेन्दु-सृष्ट-निर्म्मोकपट्टैरिव या बभासे ॥ ४
दिदृक्षुरन्तःसरसीमलङ्घ्यं यत् खातहंसः समुदीक्ष्य वप्रम् ।
सस्मार नूनं दृढ-क्रौञ्च-कुञ्ज-भागच्छिदो भार्गव-मार्गणस्य ॥ ५
रथ्यासु यस्यां रदिनो गृहाणामादर्शभित्तौ कृतवन्ध्यघाताः ।
स्वविम्बमालोक्य ततं प्रमाणं चक्रुर्मदामोदमरिद्विपानाम् ॥ ६
लग्नैकभागं सितहर्म्म्य-शृङ्गे विकृष्य मन्देन समीरणेन ।
दीर्घीकृतं वाल-मृणाल-शुभ्रं करोति यत्र ध्वजकृत्यमभ्रम् ॥ ७
यस्यां युवत्यो विहिता विधात्रा रत्नैरिवापुर्ववपुः प्रकर्षम् ।
प्रवालशीर्षा वदनं सुवर्णं मुक्तामयाङ्गावयवा वहन्त्यः ॥ ८
आलिङ्ग्य तुङ्गं वडभी-विटङ्कं विश्राणितात्मध्वनि पुष्करेषु ।
यत्सौधकान्तेरिव संविभागं चक्रे सितं शारदमभ्रवृन्दम् ॥ ९
प्रभा-विवृत्तिर्वितता पताका स्वासन्नजीमूतघटासु यस्याम् ।
विद्युन्निभा काञ्चनपिञ्जरासु ततान तोषं शिखिनामुदग्रम् ॥ १०
यत्र च्युतोद्बृंहित-तामसानि रत्नाश्म-नीलोपल-तोरणानि ।
क्रोधप्रमोदौ विदधुर्विभाभिर्नारीजनस्य भ्रमतो निशासु ॥ ११
तत्राभवत् पंक्तिरथाभिधानो भर्त्ता भुवो भानुनिभः प्रभावैः ।
क्षत्रान्वयैर्बिभ्रदलंघ्यमन्य-म्लानायमानं जयमानमोजः ॥ १२

अखण्डमानो मनुजेश्वराणां मान्यो गुणज्ञो गुणजैर्मनोज्ञैः ।
दिशो यशोभिः शरदभ्र-शुभ्रैश्चकार राजा रजतावदाताः ॥ १३
जिगीषुराजावजनन्दनोऽसौ पूर्वं विजिग्येऽन्तरितानजय्यान् ।
द्विषः षडभ्यस्त-समस्त-शास्त्र-ज्ञानोपरुद्धेन्द्रिय-वाजिवेगः ॥ १४
तेनालसत्वं पुरुषोत्तमेन बलिप्रतापापहविक्रमेण ।
त्रैलोक्य-दुर्लंघ्य-सुदर्शनेन नानन्तभोगाश्रयिणापि तेने ॥ १५
दण्डस्ततस्तस्य भुवं जिगीषोः कम्पं वितन्वन् विहिताक्रमर्द्दैः ।
तापैक-हेतुस्त्रिदशाधिपस्य दिशां ज्वरस्तीव्र इवाविवेश ॥ १६
समुद्रमुल्लंघ्य गतस्तदीयस्तेजोऽभिधानो गुरुरश्मिराशिः ।
नितान्त-सन्तापित-पूर्वकाष्ठः प्रोत्स्वेदयामास नृपं कटाहे ॥ १७
भुजङ्गमप्रार्थित-सेव्यवेला काञ्चीगुणाकर्षित-सार्थलोका ।
दिगदक्षिणा कर्कश-यत्न-भोग्या वेश्येव भुक्ता नृवरेण तेन ॥ १८
विनिर्ज्जितोऽप्यस्य शरेण घातं लब्ध्वासुरासुप्रघसायुधस्य ।
आत्मानमन्यैरसमानमानं मेने मनस्वी युधि यावनेन्द्रः ॥ १९
तेजश्छलेनाथ हुताशनेन श्रीवासरम्यं प्रदहन् तुरुष्कम् ।
धूपैरिवासक्तगतैर्यशोभिराशीयमन्तं सुरभीचकार ॥ २०
परेषु वात्यापरिबृंहितोऽस्य क्रोधाभिधानो युधि चित्रभानुः ।
आताम्रनेत्रच्युत-वारिवर्षैरनायि शान्तिं रिपुकामिनीनाम् ॥ २१
तस्यैकवाणासनभग्नशत्रोरालोकभूमौ चरणारविन्दे ।
आसेदतुः सर्वनरेन्द्रमौलिरत्नप्रभालक्तकमण्डनानि ॥ २२
लोकस्तदीये भुवि हारगौरे कीर्त्तिप्रताने प्रविजृम्भमाने ।
अभिन्नकोशं कुमुदं निरीक्ष्य मुमोच चन्द्रोदयशङ्कितानि ॥ २३
समस्तसामन्तनृपोत्तमाङ्गान्यध्यास्य तस्योन्नतवृत्ति तेजः ।
जज्वाल चूडागतपद्मरागरागच्छटाविस्फुरणच्छलेन ॥ २४
नरेन्द्रचन्द्रस्य यशोवितानज्योत्स्ना महीमण्डलमण्डनस्य ।
तस्यारिनारीनयनेन्दुकान्तनिष्यन्दहेतुर्भुवनं ततान ॥ २५
माता भवित्री भवतुल्यधाम्न इन्द्रद्विषद्भर्त्तृनिसूदनस्य ।
तेनोपयेमे समयं विदित्वा अग्नेः समक्षं विधिवद्विधेया ॥ २६
महेन्द्रकल्पस्य महाय देव्याः स्फुरन्मयूखा सरणिर्नखानाम् ।
पादद्वयान्ते जितपद्मकोशे मुक्तेव मुक्ताविततिर्विरेजे ॥ २७

लीलागतीरत्र निसर्गसिद्धा मत्तो न दन्ती मुषितो न हंसः ।
इतीव जंघायुगलं तदीयं चक्रे तुलाकोट्यधिरोहणानि ॥ २८
तस्या हतं मन्मथवाणपातैः शक्यं विधातुं न निमील्य चक्षुः ।
ऊरू विधात्रा नु कृतौ कथं तावित्यास तस्यां सुमतेर्वितर्कः ॥ २९
विम्बाधराया नवयौवनश्री-सम्पर्कतो वृद्धिमभिव्रजन्तौ ।
इतीव वद्धा रसनागुणेन श्रोणी पुनर्वृद्धिनिषेधहेतोः ॥ ३०
अस्योदरस्य प्रतितुल्यशोभं नाप्नोति धात्रा भुवनत्रयेऽपि ।
संख्यानरेखा इव संप्रयुक्तास्तिस्रो विरेजुर्वलयः सुदत्याः ॥ ३१
वयःप्रकर्षादुपचीयमानस्तनद्वयस्योद्वहनश्रमेण ।
अत्यन्तकार्श्यं वनजायताक्ष्या मध्यं जगामेति ममैष तर्कः ॥ ३२
अरालकेश्या अलके विधात्रा विधीयमाने चलतूलिकाग्रात् ।
च्युतस्य विन्दोरसितस्य मार्गरेखेव रेजे नवरोमराजिः ॥ ३३
तस्या मुखेन्दुं कुचचक्रवाकौ यस्मान्न विश्लेषयति द्वयं नौ ।
नायं शशी तत्प्रतितुल्यमन्यदिति स्म तर्कादिव पश्यतस्तौ ॥ २४
निर्जिग्यतुर्वालमृणालनालं सच्छिद्रवृत्तं किल दीर्घसूत्रम् ।
सुश्लिष्टसन्धी शुभविग्रहौ तौ तन्व्या भुजौ किं यदि तत्र चित्रम् ॥ ३५
कान्तिप्रकर्षं दशनच्छदेन सन्ध्याघने वद्धपदं हरन्त्याः ।
तस्या गृहोद्यानसरोगतस्य हृतस्य एवाम्बुरुहस्य रागः ॥ २६
आसीदयं चन्द्रमसो विशेषस्तदक्षिचन्द्रस्य च भासुरस्य ।
विभर्त्ति पूर्वः सकलं कुरङ्गं तस्यैव नेत्रद्वितयं द्वितीयः ॥ ३७
कान्तिश्रिया निर्ज्जितपद्मरागं मनोज्ञगन्धं द्वयमेव शस्तम् ।
नवप्रबुद्धं जलजं जलेषु स्थलेषु तस्या वदनारविन्दम् ॥ ३८
इन्दीवरस्यान्तरमेतदस्या नेत्रोत्पलस्यापि यतो हिमांशोः ।
त्विषोऽपि नैकं सहते मुखाख्यमाक्रम्य तस्थावपरं शशाङ्कम् ॥ ३९
युग्मं भ्रुवोश्चञ्चलजिह्म-पक्ष्म-सम्पर्कभीत्यासितलोचनायाः ।
प्रोल्लङ्घ्य दूरोत्सरणं विधित्सु मध्येन तस्थाविति मे वितर्कः ॥ ४०
तत्केशपाशावजितात्मवर्हभारस्य वासः शिखिनो वनेषु ।
लज्जां तिरश्चामपि जातु चेतश्चक्रे जनस्य स्पृशतीति शङ्काम् ॥ ४१
दोषोऽपि यस्या भुवनत्रयस्य वभूव रक्षोभयनाशहेतुः ।
अन्यापि कन्या जितसिद्धकन्या तादृग्गुणा तस्य वभूव देवी ॥ ४२ ॥

CANTO I.

Translation.

1. In this earth there once was a great city of the name of Ayodhyá; a city that surpassed all other cities in respect of wealth and prosperity. So prosperous (was it, that it looked) as if it had fallen down from heaven by the weight of its great wealth. It was a city which was a great resort of the Kshattriya race, as the S'amí tree is the constant abode of fire.

2. The moon became radiant by the reflected refulgence of the rubies that decked the spires of the lofty edifices of that city. Nay, her (the moon's) countenance became florid through jealous wrath at the sight of the superior charms of the fair females that lived there.

3. The opulence and prosperity of that city brought joy to all, except to young maidens that sought their lovers. For the lustre that issued from the gems of the golden gates of that city dissipated darkness and made night bright as day.

4. The glowing flags of China satin, which streamed in the sky from the lofty steeples of the mansions of that city, seemed like projections chiselled out from the moon.

5. The swans that were swimming in the moat surrounding the city-wall cast wistful looks towards the lakes of the city; but out of despair, owing to the lofty walls which stood in their way, they were reminded of the exploits of Paraśu-ráma, who by his arrow cut a passage through the Mount of Krauñcha.

A brief account of Bháskara, and of the works written, and discoveries made, by him.—By the late Paṇḍit Bápu Deva S'ástrí, C.I.E.

[Note by Editor.—The following paper was found amongst the papers of the deceased Paṇḍit after his death in 1890 and communicated to the Society, of which he was an Honorary Member, by his relations. It forms a portion of the preface to his revised edition of Mr. Wilkinson's translation of the *Goládhyáya* of the *Siddhánta S'iromaṇi*, published in the "Bibliotheca Indica," so far back as 1861. This preface was, apparently by an accident, not printed at the time, and the Paṇḍit kept it by him, and spent considerable pains over numerous and careful corrections, which he subsequently added. There seems to be no doubt that he intended to publish it on some future occasion, and there cannot be a better place for its appearance than the *Journal* of the Society of which he was so long a valued member.]

Bháskara was born in 1036 of the *Sáliváhana* era—or in the year 1114, A. D.—Some authors mention that he was an inhabitant of Bira, a Maráṭhá village; but he himself states, at the end of his *Goládhyáya*, that his native place was near the Sahyádri, or the Western Gháṭs, and it appears to me that he was an inhabitant of Víjapura, the ancient metropolis of the Karnatik. Some say that he was a Maráṭhá Bráhman follower of the Yajurveda; but his method of annotating, which is still current in the Karnatik in annotating poetical works, shews that he was a Kanaṛá Bráhman of Víjapura. His father, named Maheśvara, was a very great Paṇḍit and Astronomer, and a virtuous man. He had acquired the title of *A'chárya* (Doctor) in the assembly of the Paṇḍits.

Bháskara studied all the sciences acquired by him with his father. It cannot be ascertained whether he or his father was patronized by any Rájá, or whether he was a rich or poor man. But it is certainly true that he was expert in science, a very great poet, and an excellent Astronomer.

In his time, Lalla's work on astronomy, called *Sishya-dhívṛiddhida-Tantra*, more usually styled the *Dhívṛiddhida* simply, was much used, as the *Siddhánta-Śiromaṇi* is at present. Bháskara first made a commentary on Lalla's work, and then wrote his own work on astronomy, called *Siddhánta-Śiromaṇi*, in two parts, *Gaṇitádhyáya* and *Goládhyáya*, composing before it two introductory works: the first on Arithmetic, called *Páṭí*, or *Lílávatí*, and the second on Algebra.* He compiled his excellent work *Siddhánta-Śiromaṇi* in the 36th year of his age, or 1150, A. D. Its first part, *Gaṇitádhyáya*, is divided into 12 chapters, *viz.* :—

Chapter I. Called the *Madhyagati*, which treats of the rules for finding the mean places of the planets, contains 7 sections.

Section 1. Kinds of time.

Section 2. Revolutions of the planets, &c.

Section 3. Rules for finding the *ahargaṇa* (or enumeration of mean terrestrial days elapsed from the commencement of the Kalpa) and thence the mean places of the planets, &c.

Section 4. The dimensions of the *Brahmáṇḍa* (universe), and of the orbits of the planets, and thence the rules for finding the mean places of the planets.

Section 5. This section, called *Pratyabda-Suddhi* (the remainders of additive months at the beginning of each year), treats of rules for finding the remainders of additive months, subtractive days, &c., at the beginning of each year, the small *ahargaṇa* (or enumeration of the days elapsed from the beginning of the current year) and thence the mean places of the planets.

Section 6. Determination of additive months and others.

Section 7. The *Deśántara* correction, &c., and conclusion of the first chapter.

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* [Or *Víjagaṇita*. Both have been translated by Colebrooke,—Ed.]

Chapter II. Called the *Spashṭa-gati*, which treats of the rules for finding the apparent places of the planets.

Chapter III. Called the *Tripraśna*, treats of the rules for resolving questions on time, finding the positions of places and directions.

Chapter IV. Called *Parva-sambhava*, on the possibility of the eclipses of the sun and moon.

Chapter V. Of lunar eclipses.

Chapter VI. Of solar eclipses.

Chapter VII. Rules for finding the lengths of the shadows reflected from the planets.

Chapter VIII. On the rising and setting of the planets.

Chapter IX. On the phases of the moon and the position of the moon's cusps.

Chapter X. On the conjunction of the planets.

Chapter XI. On the conjunction of the planets with stars.

Chapter XII. Rules for finding the time at which the declinations of the sun and moon become equal.

The second part of the *Siddhanta-S'iromaṇi*, called *Goládhyáya* is divided into 13 chapters, with an appendix. Of this part the translation is given here.

[The translation of the *Goládhyáya*, or Treatise on the Sphere, being now out of print, the following account of its contents is added for the sake of completeness :—

Chapter I. In praise of the advantages of the study of the sphere.

Chapter II. Questions on the general view of the sphere.

Chapter III. Cosmography, (including a refutation of the supposition that the earth is level).

Chapter IV. On the principles of the rules for finding the mean places of the planets.

Chapter V. On the principles on which the rules for finding the true places of the planets are grounded.

Chapter VI. On the construction of an Armillary Sphere.

Chapter VII. On the principles of the rules for resolving the questions on time, space, and directions.

Chapter VIII. The explanation of the cause of eclipses of the sun and moon.

Chapter IX. On the principles of the rules for finding the time of the rising and setting of the heavenly bodies.

Chapter X. On the cause of the phases of the moon.

Chapter XI. On the use of astronomical instruments, *viz*., (1) the gnomon, (2) the vertical circle, (3) the *Phalaka* (invented by Bháskara), (4) the *Yashṭi*, or staff, (5) the *Dhí-yantra*, or genius-instrument, (6) the self-revolving instrument, (6) the syphon.

Chapter XII. The seasons.

Chapter XIII. Useful questions,—a collection of problems. Ed.].

In this work Bháskara has variously exposed the errors of Lalla, whose work he had formerly annotated.

We now proceed to mention the discoveries of Bháskara.

1. He discovered that the earth has the inherent property of attracting all things around it,* and

2. That portion of the equation of time which is due to the inclination of the ecliptic to the equinoctial.†

3. He found out the *tátkálika*, or instantaneous motion of the variable quantities—the planet's longitude, and the sine of the arc.

Bháskara says "the difference between the longitudes of a planet found at any time on a certain day, and at the same time on the following day, is called its rough motion during that interval of time; and its *tátkálika* motion is its exact motion."

The *tátkálika*, or instantaneous motion of a planet, is the motion which it would have in a day, had its velocity at any given instant of time remained uniform. This is clear from the meaning of the term *tátkálika*, and it is plain enough to those who are acquainted with the principles of the differential calculus, that this *tátkálika* motion can be no other than the differential of the longitude of a planet. This *tátkálika* motion is determined by Bháskara in the following manner.‡

* * * * * * * * *

Now, the term *tátkálika* applied by Bháskara to the velocity of a planet, and his method of determining it, correspond exactly to the differential of the longitude of a planet and the way for finding it. Hence it is plain that Bháskara was fully acquainted with the principle of the differential calculus.§ The subject, however, was only inci-

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* [*Siddhanta-S'iromaṇi.* Chap. III, 6.—Ed.]

† [*Siddhanta-S'iromaṇi.* Chap. V, 16, 17.—Ed.]

‡ [The calculations given by the author are omitted, as they have already been published in *J. A. S., B.*, Vol. XXVII, pp. 213 and ff.—Ed.]

§ [See, however, two papers by Spottiswoode in the *Journal* of the Royal Asiatic Society, Vol. XVII, p. 222 and Vol. XX, p. 345. Mr. Spottiswoode considered that the paṇḍit had overstated his case. He added 'Bháskara undoubtedly conceived the idea of comparing the successive positions of a planet in its path, and of regarding its motion as constant during the interval, and he may be said to have had some rudimentary notion of representing the arc of a curve by means of auxiliary straight lines. But on the other hand, in the method here given, he makes no allusion to one of the most essential features of the Differential Calculus, *viz.*, the infinitesimal magnitude of the intervals of time and space therein employed. Nor indeed is anything specifically said about the fact that the method is an approximative one.

'Nevertheless, with these reservations, it must be admitted, that the penetration dentally and briefly treated of by him, and his followers, not comprehending it fully, have hitherto neglected it entirely.

4. The ancient astronomers Lalla and others say that the difference between the mean and true motion of a planet becomes nothing when the planet reaches the point of intersection of the concentric and excentric. But Bháskara, denying this, says that when the planet reaches the point where tne transverse diameter of the concentric cuts the excentric, the difference of the mean and true motions becomes 0.*

For let p be the mean place of a planet at any time on a certain day, and p' that at the same time on the next day; and e and $\acute{e}$ be the amounts of the equation respectively: then $p+e$ and $p'+\acute{e}$ will be the true places of the planet; $\therefore p'-p+(\acute{e}-e)$ will be the true motion of the planet; taking $p'-p$ the mean motion from this, the remainder $\acute{e}-e$ is the difference between the amounts of the equation. Thus, it is plain, that the difference between the mean and true motions of the planet is the rate of the increase or decrease of the amount of the equation. Therefore where the amount of the equation becomes greatest, the rate of its increase or decrease will be nothing; or the difference between the mean and true motions equals 0. But as the amount of the equation becomes greatest, when the planet reaches the point of the excentric cut by the transverse diameter of the concentric (see the note on verses 15, 16 and 17 of Chapter V), the rate of its increase or decrease must be nothing; that is, the difference between the mean and true motions will be nothing at the same point. This is the principle of the maxima and minima, with which, it is thus evident, Bháskara was acquainted.

5. He ascertained that when the arc corresponding to a given sine or cosine is found from the table of sines, this will be not far from its exact value, when it is not nearly equal to 90° or 0° respectively.†

6. He discovered the method of finding the altitude of the sun, when his declination and azimuth and the latitude of the place are given. This is a problem of Spherical Trigonometry, which he first solved by two rules in the *Gaṇitádhyáya*. Of these two rules, we have shown one in the note on verse 46 of the 13th Chapter of the *Goládhyáya*, and the other is the following:—

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shown by Bháskara in his analysis, is in the highest degree remarkable; that the formula which he establishes, and his method of establishing it, bear more than a mere resemblance—they bear a strong analogy—to the corresponding process in modern mathematical astronomy; and that the majority of scientific persons will learn with surprise the existence of such a method in the writings of so distant a period, and so remote a region.' Ed.]

* [*Siddhanta-S'iromaṇi.* Chap. V, 39. Ed.]

† [*Siddhanta-S'iromaṇi.* Appendix. Ed.]

Multiply the equinoctial shadow by the radius and divide the product by the cosine of the azimuth. Assuming the result as an equinoctial shadow, find the sine of an assumed latitude, *i. e.*, finding the *Akshakarṇa* from this equinoctial shadow, say :—

as the *akshakarṇa*
: the equinoctial shadow or the result
:: the radius
: the sine of assumed latitude.

Now the sine of the sun's declination multiplied by the sine of latitude of the given place gives the sine of assumed declination.

Add the assumed declination to the assumed latitude, when the sun's declination is south ; but when the declination is north, subtract it. The result will be the zenith distance of the sun.*

Demonstration. First of all he found the shadow of the gnomon, when the sun, revolving in the equinoctial, arrived at the given vertical circle, *i. e.*, when the sun has the given azimuth, as follows :—

Draw a circle on a level surface with a given radius, and draw two diameters perpendicular to each other, east and west and north and south ; then, at the equinoctial day, if we place a gnomon of 12 digits on the level so that the end of its shadow fall on the centre, the distance of the gnomon's bottom from the east and west line must be equal to the equinoctial shadow of the given place. Now draw a line from the centre to the gnomon's bottom and produce it. It will meet the circumference at the distance of the complement of the azimuth from the east or west point.

Then say—

as the cosine of the azimuth
: the radius
:: the distance of the gnomon's bottom from the east and west line, *i. e.*, the equinoctial shadow
: the gnomon's shadow.

From this shadow find its hypothenuse, then say

as the hypothenuse
: shadow
:: radius
: the sine of the zenith distance when the sun is in the equinoctial having the same azimuth.

Call this sine the sine of assumed latitude.

Then by similar triangles—

as the sine of the latitude of the place in the plane of the meridian

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* That is, assuming the given place of the observer to be in the northern hemisphere.

: the sine of the assumed latitude in the plane of the vertical
:: the sine of the sun's declination in the plane of the meridian
: the sine of the assumed declination in the plane of the vertical.

This is the sine of the arc of the vertical circle intercepted between the equinoctial and the sun's place.

Add this arc to the assumed latitude, or to the arc of the vertical circle from the zenith to the equinoctial when the declination is south; but when it is north substract the arc, the result will be the zenith distance of the sun. Hence the rule.

Then he says that if the complement of the sun's azimuth be less than his amplitude, when he is in the northern hemisphere, the vertical circle will cut the diurnal circle in two points above the horizon. Hence on the same day the sun will enter the same vertical circle at two different times, and therefore the sun's zenith distance will admit of two different values. Bháskara determined these two values thus:—

Subtract the assumed latitude above found from 180°. The remainder will be the second value of the assumed latitude. Then from these two values of the assumed latitude find the two different values of the zenith distance. The reason is very plain.

7. The ancient astronomers, Lalla, S'rípati, &c., erroneously used the versed sine and radius in finding the *valana* or variation (of the ecliptic). Bháskara himself refuted their rules variously, and used the right sine and the cosine of declination in the place of the versed sine and the radius respectively (see the last portion following the 29th verse of the 8th chapter of the *Goládhyáya*).

8. It is stated in the *Súryasiddhánta* and other ancient astronomical works, that the end of the gnomonical shadow revolves in the circumference of a circle, which Bháskara boldly refuted.

Besides the above Bháskara discovered many other matters which are not so important as to deserve mention here. He wrote an annotation called *Vásanábháshya* on his work himself, the style of which is very good and plain. Before he wrote this commentary, he composed two other works,—one a *Karaṇa** and the other called *Sarvatobhadrayantra*, to find the hour of the day. Both of these works are now extant. He wrote another *Karaṇa* in the 69th year of his age, which is now very common. It appears, therefore, that Bháskara lived to the age of more than 69 years. After him, no great astronomer has appeared among the Hindús up to the present time.

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* A treatise on astronomical calculation, where the epoch is taken from the commencement of the work.

On some new or rare Muhammadan and Hindú Coins, No. III.—By DR. A. F. RUDOLF HOERNLE. (With two Plates).

[For Nos. I and II of this series, see this *Journal*, Vol. LVIII, Part I of 1889, p. 30, and Vol. LIX, Part I, for 1890, p. 169. Compare also Vol. LII, Part I for 1883, p. 211.]

In the course of examining coins that are submitted to me under the Treasure Trove Act, I have come across some that deserve a fuller description than I could give them in my Reports to the Government.

(A) COINS OF THE INDEPENDENT SULTANS OF BENGAL.

Towards the end of 1891 I received a lot of coins from Sibságar in Assam. Among them there were 38 coins of the Independent Sultáns of Bengal. In July 1892 I received another set of 28 coins of the same Sultáns from Bhágalpur. Reports on both finds are published in the Society's *Proceedings* for August 1893. Among these coins I found the following new types or new varieties of known types.

(XXXV.) JALÁLU-D-DÍN MUḤAMMAD SHÁH.

817–835 A. H. = 1414–1431 A. D.

(1) See Plate VIII, fig. 1. Now in the Indian Museum. This is merely a new variety of the coin, published by Mr. Blochmann in this *Journal*, Vol. XLIII, p. 294, pl. XIII, No. 2, and in the British Museum Catalogue, No. 87. The legends on both faces are in tughra characters.

Obv.: [illegible] الله نا الاسلام و المسلمين [illegible]
خليفة ضر

The date 834, in very large figures, is on the left,* and the mint *Chatgáon* on the right side, partly illegible. In the specimens published by W. Blochmann, the date as well as the mint is on the right side. On the British Museum specimen the mint is said to be beneath. But I doubt this; it appears to me to be the usual legend خليفة ضر. The date and mint would be on the sides, but the coin is too badly disfigured by cuts to show them.

(2) Plate VIII, fig. 2. Now in the Indian Museum. This is another specimen of that published in the British Museum Catalogue,

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* Unfortunately, owing to a knob caused by a shroff mark on the reverse, the date has not come out very clearly in the photograph. It is however, perfectly distinct on the coin itself.

No. 83, and I only publish it here, because it is in nearly perfect condition. The beginning of the name *Jalál* is lost or disfigured in every other specimen I have hitherto seen. The mint also is a curiosity; for it seems to read (left-hand margin) فی الفیروزاباد *fí al-Fírúzábád.* The more usual form is فی البلدة فیروزاباد *fí al-bildat Fírúzábád.* The date is 824 (سنة ۸۲۴, bottom, margin). The whole margin reads:

ضرب هذا السکه فی الفیروزاباد سنه ۸۲۴

The date is in large sprawling figures.

(3) Plate VIII, fig. 3. Now in the Indian Museum. This is a new type which I do not remember having seen published anywhere. The obverse legend is new.

Obv.: in circular area:

نا الاسلام
وا ضر
لمسلمین
خلد ملکه

Margin: ضرب هذه السکه فی (.......) سنه ۸۳۳

Rev.: lettered surface with usual legend in tughra.

The date is 83(3?); the last figure may be 3 or 4. I cannot identify the mint name; it seems to be a new mint of 7 or 8 letters, ending in ه *h*.

(4) Plate VIII, fig. 4. Now in the Indian Museum. This is another new type, with an entirely new kind of obverse design. It consists of a small circular centre with the legend عبد الجبار *Abdu-l-Jabbár* 'Servant of the Omnipotent.' Around is a broad inner circle and a narrow margin, both covered with arabesques. At the bottom of the margin there appears to be the date 8*5 (825 or 835), now partly obliterated by a shroff-mark.

The reverse has the usual legend in tughra, as, *e.g.*, in the British Museum Catalogue, No 33.

(XXXVII.) NÁṢIRU-D-DÍN MAḤMÚD SHÁH.

846–864 A. H. = 1442–1459 A. D.

This Sultán struck a very great variety of coins. Mr. Blochmann has published nine different kinds in this *Journal*, Vol. LXIII, p. 295 and Vol. XLIV, pp. 288, 289, Pl. XI, Nos. 2–9. I myself have published eleven other varieties in this *Journal*, Vol. LII, pp. 217–219, Pl. XVI, Nos. 1–8 and Pl. XVII, Nos. 9–11. Here are four additional varieties.

1. Plate VIII, fig. 5. Now in the Indian Museum. This is a new variety of the same type to which "Col. Hyde's" coin, published by Mr. Blochmann in this *Journal*, Vol. XLIII, p. 295, belongs. The

peculiarity of this type is that both its margins are not filled with legends, but with various ornamental markings. The present coin differs from Col. Hyde's in showing on the reverse the "kunyat" *Abul Mujáhid*, and bearing no date. There are also some other slight differences in the arrangement of the lettering and in the ornamental markings.

Obverse: in circular area:—

المويد
بتائيد الرحمن
خليفة الله
و ا هان
بالحجت لبر

Margin: ornamental scrolls.

Reverse: in circular area:

الدنيا ا
ناضر و لدين
ابو لمجا هد محمود
شاه السلطان

Margin: ornamental scrolls.

There is neither mint nor date.

2. Plate VIII, fig. 6. Now in the Indian Museum. This is merely another die of the same variety of coin, which has been published by Mr. Blochmann in this *Journal*, Vol. XLIV, p. 289, Pl. XI, No. 9, and by myself in Vol. LII, p. 218, Pl. XVII, No. 9. I publish it for three reasons. In the first place, because it is in very good condition and shows plainly the "kunyat" *Abul Mujáhid*. In the second place, because it gives a new date; and in the third place, because it shows that my description given in Vol. LII, p. 219 is wrong. The obverse legend is not (as I then thought, being misled by the bad condition of the coin) distributed over area and margin, but area and margin have, each, their own distinct legend.

Obv.: in circular area:

نا الاسلا
واضرم
لمسلمين
خلد ملكه

Obv. margin:

ضرب هذه السكه
في (.......) سنه ۸۴۲

Rev.: in circular area, within ornamental margin:

الدنيا
ناضر
و الدين ابو
المجاهد
محمود شاه
السلطان

The date (just above of *Náṣir*) is 842. This is noticeable. The earliest proved date, hitherto known, of Maḥmúd Sháh was 846, and he reigned up to 864. Native historians give him 27 years (or even

32) of reign. Accordingly his reign should have commenced in 638. Mr. Blochmann, after discussing the subject (Vol. XLII, p. 269), adds: "We require, therefore, more evidence to fix the beginning of Maḥmúd's reign." Here, then, we have evidence carrying that Sultán's reign back to 842.

The mint name I am unable to read satisfactorily, but it is apparently the same as that above on No. 3 of Jalálu-d-dín Muḥammad Sháh. The first part, here, might be *al-Balad;* though, perhaps, the name is only a very crude way of writing *Fírúzábád;* compare the appearance of the latter name on No. 3, below.

There were five specimens of this coin. One has no date; another has 843; on the remaining two the unit figure is not distinctly legible, it may be 1 or 2 or 3. The specimen dated 843 is now in the British Museum. The undated specimen seems to be of the Mu'aẕẕimábád mint.

3. Plate VIII, fig. 7. Now in my own cabinet. This is a new type.

Obv.: area in indented quatrefoil:

نا الأسلا
واضرم
لمسلمين
خلد ملكه

Obv.: margin in sections:

upper left: ضرب هذه
lower „ : السكه فی
lower right: فیروزاباد سنه
upper „ : ٨٤٣

Rev.: in circular area within ornamental border:

الدنیا
ناصر
والدین ابو
المجاهد محمود
شاه السلطان

No marginal legend.

It may be noticed that this is again a coin of the *Abul Mujáhid* type, and that the date is another early one of 843.

There were seven specimens of this coin; all, except two, dated 843. On the remaining two the date is lost. One of them is now in the Indian Museum, Calcutta; another, in the British Museum.

4. Plate VIII, fig. 8. Now in the Indian Museum; the only specimen of this kind in the find. It is apparently a duplicate of the coin published by me in this *Journal*, Vol. LII, p. 218, Pl. XVI, No. 4, but it is in much better preservation, showing all the peculiarities of this type of coin.

Obv.: in circular area,
within ornamental margin:

عوث الا سلام
ملكه
و المسلمين خلد
في فيروزاباد ٨٥٨

Rev.: in oblong double-lined toothed area, within a circle surrounded by dots:

الدنيا و الد ابو المظفر
نا صر ين
محمود شاه ا[لسلطان]

The toothed or fringe-like ornamentation is peculiar.

The date 858 is distinct. The mint *Fírúzábád* is probable.

I wish to draw attention to two points:—

Firstly, these new coins carry Náṣiru-d-dín Maḥmúd Sháh's rule back to the years 843 and 842. The end of his reign is well ascertained to have been in 864, by Bárbak Sháh's inscription of 865 and Maḥmúd's own coin of 864 (*Journal* LII, p. 216, No. 8*b*). This gives Maḥmúd Sháh a reign of, at least, 23 years, and goes some way in support of the statement of the native historians. Some of them say, that he reigned 32 years, others, that he reigned "not more than 27" years. These conflicting statements are susceptible of a not improbable explanation. Giving Maḥmúd Sháh 32 years, his reign would have commenced in 833. Mr. Blochmann (*Journal*, Vol. XLII, p. 268) shows with great probability, that Shamsu-d-dín Aḥmad Sháh's reign must have commenced in 834 or thereabouts. He was the third member of an usurping Hindú dynasty, and the native historians relate, that he was so cruel and tyrannical that Náṣir Sháh (afterwards Maḥmúd Sháh), a descendant of the old Muḥammadan dynasty of Ilyás Sháh, with the support of the old party, set up an opposition reign. What happened, I suppose then, was this: Aḥmad Sháh succeeded in 832; soon afterwards, in 833, Maḥmúd Sháh set up his counter-reign; Aḥmad certainly lived to 836, as shown by one of his coins (see this *Journal*, Vol. XLII, p. 268, and Brit. Mus. Cat., No. 88), and he probably lived to 838, in which year accordingly Maḥmúd Sháh become sole and indisputed ruler of Bengal. Counting Maḥmúd's reign from 833, we obtain a total of 32 years, but counting from 838, a total of 27 years.

Secondly, in this *Journal*, Vol. LII, pp. 212–216, I have fully proved, that Maḥmúd Sháh I made use of the two kunyats, *Abul Muẓaffar* as well as *Abul Mujáhid*. I gave another proof of the use of two kunyats in *Journal*, Vol. LIX, p. 167. The coins I now publish add further proof, if any were needed. In the British Museum Catalogue published in 1885, I see, there are two coins still ascribed to Náṣiru-d-dín Maḥmúd Sháh II (Nos. 103, 104), following herein Mr. Blochmann, who in 1873

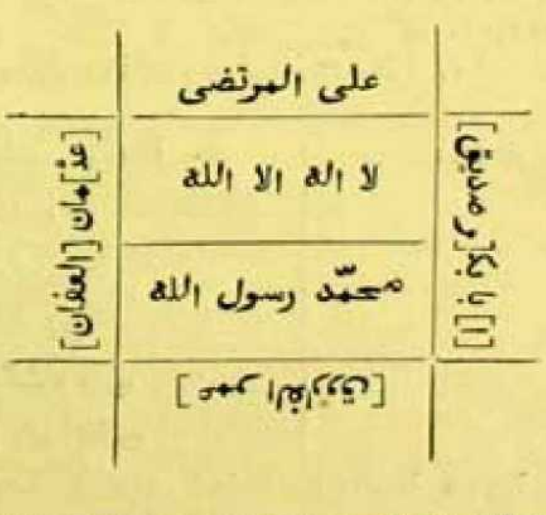
(*Journal*, Vol. XLII, p. 289) first ascribed that type of coin to Maḥmúd II. The only reason for this determination, given in the British Museum Catalogue (p. 42, footnote), is that this type of coin gives the kunyat *Abul Mujáhid*, which is said to distinguish Maḥmúd II from Maḥmúd I and Maḥmúd III, both of whom use the kunyat *Abul Muẓaffar.* I proved, already in 1883, that this reason was worthless; for Maḥmúd II uses both *Abul Mujáhid* and *Abul Muẓaffar*. Now the coin, British Museum Catalogue No. 104, is not dated, and therefore there is just a possibility that it may be a coin of Maḥmúd II (who, however, was a mere child and only reigned for six months); but there is no argument in support of that possibility, and the probabilities are all in favour of Maḥmúd I. He coined a great variety of types, and the style of the reverse of that No. 104 reminds one of the very similar style of Maḥmúd I's son and successor Bárbak Sháh in his coin (Br. M. Cat.) No. 90. For my part, therefore, I prefer to ascribe the coin No. 104 (Br. M. Cat.) to Maḥmúd I, until dated coins of Maḥmúd II are found to prove the contrary. For another striking instance of the use of two different kunyats see below under Shamsu-d-dín Muẓaffar Sháh.

(XXXIX.) SHAMSU-D-DÍN YÚSAF SHÁH.

879–886 A. H. = 1474–1481 A. D.

(1) Plate VIII, fig. 9. Now in the Indian Museum. Only one coin of this type was found. It is an entirely new type.

Obverse: divided by four intersecting lines, so as to form a central square, with four exterior segments, the centre square itself being divided by a horizontal line into two equal oblong compartments. Thus:—



The two central compartments contain the creed; the four segments, the names of the four Imáms, of which, however, only 'Alí's name is fully legible in the top segment.

The Reverse is divided into four parallel compartments by three horizontal lines. The legend is as follows:—

الدنيا الد
شمس و ين
لمظفر يوسف
ابو شاه السلطان
باربكشاه السلطان محمود
[شاه] السل[طان]

There is no mint name and date on the coin, so far as I can see.

(2) Plate VIII, fig. 10. Now in the Indian Museum. Only one coin of this kind was found.

Obv.: in circular area:	Rev.: in lozenge area:
The Creed. Below: Mint and date illegible.	نيا الد و ا شمس لدين ابو المظفر يوسف شاه السلطان ابن باربكشاه السلطان ابن محمود شاه السلطان

The marginal segments of the reverse are too much abraded to distinguish whether they bore any legends or merely ornamental scrolls; probably the latter.

(3) Plate VIII, fig. 11. Now in the Indian Museum; only one coin of this kind.

Obv.: in circular area:	Rev.: lettered surface:
لا اله الله محمد رسول الله	(الدنيا و الدين) شمس سف ابو المجاهد يو شاه ابن باربكشاه ابن (محمود شاه السل)طان

There appears to have been no mint or date on this coin; at least I can discover no space for them.

What is particularly noteworthy, however, is that here we have again further evidence of the use, by the same king, of the two kunyats

Abul Muzaffar and *Abul Mujáhid.* The usual kunyat of Yúsuf Sháh, on coins and in inscriptions, is *Abul Muzaffar*; but on the present coin it is *Abul Mujáhid.*

(XLI.) JALÁLU-D-DÍN FATḤ SHÁH.

886–892 A. H. = 1481–1486 A. D.

1. Plate VIII, fig. 12. Now in the Indian Museum; only one coin of this kind. It is a new variety of the type, given in the British Museum Catalogue, No. 97. The only difference is in the arrangement of the lettering on the reverse.

Obverse :	Reverse :
The Creed.	السلطان (ابن)
Below : خزانه ٨٩٠	السلطان جلال الدنيا
(Treasury, 890 A. H.)	و الدين ابو المظفر
	(فتحشـ)اه السلطان ابن
	[محمود شاه السلطان]

2. Plate IX, fig. 13. Now in the Indian Museum; only one coin of this kind. This is a new variety of the type described in the British Museum Catalogue, No. 98. The latter is not figured, but, to judge from the arrangement of the lettering, I assume it to be the same as that published by Laidlay, in this *Journal*, Vol. XV, p. 329, No. 15. There the legends are in circular areas within ornamental margins. In the present coin, the arrangement is as follows:—

Obv.: area, double-lined octagon within a circle :	Rev.: area, double-lined octagon within a circle :
السلطان	فتحشاه
ابن السلطان	السلطان [ابن]
جلال الدنيا	محمود شاه السلطان
و الدين ابو	الحميد شاهے
المظفر	محمد اباد • ٨٨

The mint is clearly Muḥammadábád, and the date 88*. The unit figure unfortunately is deleted by a shroff mark.

The riddle of this coin is the correct reading of the phrase in the fourth line of the reverse. This phrase is undoubtedly the same as that which occurs in the third line of the British Museum Catalogue, No. 95, and of this *Journal*, Vol. XLII, pl. IX, No. 8. Mr. Blochmann (p. 282) read it on the latter coin as مجدة الله الفتح. This is unquestionably wrong, as the letters on the coins are not so many. The British Museum Catalogue (p. 39) reads it الحسين شاهي *Al-Ḥusain Sháhí*. On the coins, however, there is no letter (*s*) but the letter (*m*). The latter is distinct enough, even in the photograph of the British Museum specimen, but it is quite unmistakable on the present specimen. Accordingly I prefer to read *al-Ḥamíd Sháhí*. This phrase *al-Ḥamíd Sháhí* is probably of some historical importance. The similar phrase *al-Ḥusainí* is found on coins of the king 'Aláu-d-dín Ḥusain Sháh, where it is applied to Sayyid Ashraf, the father of Ḥusain Sháh. It distinguishes Sayyid Ashraf as belonging to the line of Ḥusain. In the present case the term *al-Ḥamíd Sháhí* is applied to Maḥmúd Sháh, the father of Fatḥ Sháh, and distinguishes him as belonging to the guild of Ḥamíd Sháh. Now the Riyázu-s-Salatín (Bibl. Indica ed., p. 108, see also Stewart's *History of Bengal*, p. 93, and *Journal*, Vol. XLII, p. 260, footnote) relates that the king Ghiyáṣu-d-dín 'Az̤am Sháh was a pupil of a Shaikh Ḥamídu-d-dín of Nagor, whom he used to visit to be taught divinity. Such holy men are not uncommonly popularly called by the title of *Sháh*. Accordingly Ḥamídu-d-dín would be popularly known as Ḥamíd Sháh, and pupils of his, or men professing his guild, would be called *Ḥamíd Sháhí*. Sultán 'Az̤am Sháh would be known as *al-Ḥamíd Sháhí* or 'the pupil of Ḥamíd Sháh'; and this honorific epithet would be retained by his direct descendants. It would, thence, follow that, in all probability, Maḥmúd Sháh was a younger son of 'Az̤am Sháh, his elder brother, who succeeded 'Az̤am Sháh, being Ḥamzah Sháh. Maḥmúd Sháh, in the histories, is simply described as a son of one of the descendants of Ilyás Sháh; and he took possession of the throne, after the short-lived usurpation of the Hindú family of Rájá Kans, on that title of being a descendant of the old legitimate royal family. If I am correct in my combinations, this coin of Fatḥ Sháh would thus prove that Maḥmúd was a son (if not a grandson) of 'Az̤am Sháh. 'Az̤am Sháh, probably reigned up to 799 H., and Maḥmúd Sháh's usurpation, probably (see *supra*), commenced in 833 H. He may, therefore, have very well been a younger son of 'Az̤am Sháh, being, at the time of his usurpation, a man of between 40 and 50 years. In fact, Maḥmúd Sháh may, in his early youth, have still known Ḥamíd Sháh, and have accompanied his father in his visits to the saint.

(XLV.) SHAMSU-D-DÍN MUZ̤AFFAR SHÁH.

896–899 A. H. = 1490–1493 A. D.

1. Plate IX, fig. 14. Now in the Indian Museum; only one coin of this kind. It is a new variety of the type published in the British Museum Catalogue, No. 105, and by Laidlay in this *Journal*, Vol. XV,

p. 331, No. 19. There is a slight difference in the arrangement of the lettering, but the main difference is the use of the kunyat *Abul Muzaffar* instead of the usual *Abun-Naṣar*, and in the absence of *khazánah*.

Obv.: lettered surface:	Rev.: in circular area:
لا اله	الد[نيا]
الا الله محمد	شمس
رسول الله	و الدين ابو
٨ • ٨	المظفر مظفر شاه
(8 • 8 A. H.)	السلطان خلد
	لله ملكه و
	[سلطانه]

The date, of course, must be 898. The curiosity of this coin is the kunyat *Abul Muzaffar*. Its letters are absolutely distinct, which is more than can be said for the kunyat *Abun Naṣar*, which is usually read on his coins. I have never met with any specimen on which *Abun Naṣar* could be read with equally absolute certainty; at the same time, I admit, that the reading *Abun Naṣar* on those coins (as on Br. M. Cat., No. 105) is very probable. Any how, the kunyat *Abun Naṣar* as the usual one of Muzaffar Sháh is proved by his inscriptions which uniformly give it to him (see this *Journal*, Vol. XLII, p. 290.) Here, then, we have another evidence to confirm the fact that more than one kunyat might be used by the same king. I may add that Blochmann in this *Journal*, Vol. XLIII, p. 297, footnote, affords another evidence in the fact that Aurangzíb uses the two kunyats *Abuz Zafar* and *Abul Muzaffar*, on his coins and in his inscriptions respectively. He calls this a "confusion" (whose?), but it is simply a well-established practice of some kings.

(B) COINS OF THE KALACHURI KINGS OF CHEDI.

In January last, I received from the Political Agent of the Chhatisgaṛh Feudatory States, Raipur, 56 old coins which, on examination, turned out to be coins of some of the Kalachuri kings of Chedi. A report on them has been published in the Society's *Proceedings* for April last. These coins had been found in the Sarangaṛh State. In May last, I received three more Chedi coins, which had been found in the bed of the river Ang, in the state of Patna, and a report on which is published in the *Proceedings* for August last.

As these coins, as far as I know, are the first of their kind ever found, or at least have never been published, I publish them now the more so, as in one respect I have altered my opinion published in the *Proceedings* for April last.

For information on the Kalachuri dynasty of Chedi I may refer to General Sir Alexander Cunningham's Archæological Survey Reports, Vol. XVII, p. 71 ff., and Professor Kielhorn's paper in the *Indian Antiquary*, Vol. XVII, pp. 135–138. On the accounts there given the subjoined genealogical list is based :—

Serial No.	Approximate date of accession.	Names of kings.	Actual dates from inscriptions.
1	1000 A. D.	Kokalla ...	
2	1030 „	Ratnarája I ...	
3	1060 „	Pṛithvídeva I ...	
4	1090 „	Jájalladeva I ...	1114 A. D. (866 K. S.)
5	1120 „	Ratnadeva II ...	
6	1135 „	Pṛithvideva II ...	1141 (893 K. S.),* 1145 (896 K. S.), 1158 A. D. (910 K. S.)
7	1160 „	Jájalladeva II ...	1167 A. D. (919 K. S.)
8	1175 „	Ratnadeva III ...	1181 A. D. (933 K. S.)
9	1185 „	Pṛithvídeva III ...	1190 A. D. (1247 V. S.)

The following is a list of the coins that have been found :—

Serial No.	Names of kings.	Found in Sarangaṛh State.		Found in Patna State.		Total.		Grand Total.
		large	small	large	small	large	small	
1	Jájalladeva ...	9	17	2	1	11	18	29
2	Ratnadeva ...	...	29	...	...	...	29	29
3	Pṛithvídeva ...	1	...	...	...	1	...	1
	Total ...	...	...	...	...	...	...	59

Two of the coins are of pure gold ; *viz.*, one large coin of Jájalla (found in the Patna State), and the large coin of Pṛithví Deva. All others are of mixed metal, containing gold in very varying proportions, which could only be determined by a regular assay. The other large coin of Jájalla, found in the Patna State, as well as his small coin, found there, appear to be of nearly pure gold.

In weight and size they are all practically alike ; that is, the larger coins measure 0·65, the smaller, 0·5 inches ; and the larger coins weigh 57 grains, the smaller, 15 grains. The large gold Pṛithví Deva weighs 59 grains, and one large Jájalla Deva of mixed metal weighs only 56 grains ; also one small Jájalla, only 14 grains.

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* See *Indian Antiquary*, Vol. XX, p. 84.

In design the coins are all alike. The margin is formed by a circle of dots. On the obverse is the crude figure of some animal, and on the reverse, the legend.

The legends are the following :—

I. Jájalla (Pl. IX, 15–19).
श्रीमज्जा *śrí-maj-já*
जल्लदेव *jalla-deva.*

II. Ratna Deva (Pl. IX, 20, 21.)
श्रीमद्र *śrí-mad-ra*
त्नदेव *tna-deva.*

III. Pṛithví Deva (Pl. IX, fig. 22).
श्रीमत्पृ *śrí-mat-pṛi*
थ्वीदेव *thví-deva.*

The Jájalla coins of mixed metal show on the obverse of the large specimens the akshara मा *má*, on that of the small, म *ma.* On the obverse of the gold Jájalla and the gold Pṛithví Deva, in the corresponding places, there is also some mark, which seems to be some akshara, it resembles the numeral figure ५ (5).

What animal the figure on the obverse represents, I do not venture to say. At first, I thought it was the standing figure of Hanumán, and this opinion I expressed in my report, published in the *Proceedings* for April last, p. 92. This figure can be recognized, if one takes the coin (*e. g.*, the gold Pṛithví Deva, Pl. VII, fig. 22) with the reverse (legend) side facing, and then turns over the obverse side, side-ways, from the right to the left. The obverse side, as then presented to the spectator, shows a crude figure of Hanumán standing, with his head turned to the left (showing profile), body to front, and feet to right; one of the two scrolls being his tail. The figure, of course, is very crude.

But I have since found, that holding the obverse side in a different position, other figures can be made out; and accordingly, I wish to withdraw, for the present, the conclusion which I drew from my recognition of the figure of Hanumán, in the April *Proceedings*, p. 93. If, instead of turning the gold Pṛithví Deva side-ways, from right to left, it be turned downwards from top to bottom, the obverse side, as now presented to the spectator, shows a distinct small figure of an elephant, in the lower half of the coin. His head, on the right hand side, is quite clear; his trunk is raised up and curves over; within the curve is seen one of his tusks; his body is encircled by a heavy chain (of the *howdah*); the upturned tail is just seen on the left margin; the fore-legs are partially visible, the hind-legs are cut away. This much is very clear, but what the marks on the upper half of the coin may mean, I cannot make out, unless they can somehow be taken to represent a *howdah.* See No. 21 on Plate IX.

There is still a third possibility. Holding the obverse side, in nearly the same position as for the elephant, it is just possible to recognize the figure of a bull (or a horse, or a lion), to the right, in the same recumbent position as seen on the so-called "Bull and Horseman" coins. See obverse of No. 15 on Plate IX. What was before the upturned trunk of the elephant, are now the fore legs of the bull turned under his body. A part of what might be the *howdah* (?) is now the head of the bull (or other animal), near the right hand margin.

I may add, that holding the coin in the position, now described, the akshara मा *má* presents itself upright, which renders it probable that this is the proper position in which the coin should be held. See No. 17 on Plate IX.

All this requires some exercise of the imagination, and I will leave it to more experienced numismatic eyes to determine the real nature of the obverse figure. Only one thing appears to me impossible: to recognize in it any figure of the goddess "Durgá, four-armed, seated to front." And in this respect, the coins of the present finds still appear to me very noteworthy. For all coins of the Kalachuri dynasty that hitherto have become known, show on the obverse the figure of Durgá, which is also said to have been "the cognizance of the Haihaya or Kalachuri Princes of Chedi."*

It is impossible to say, to which of the kings of the above given list the coins may belong. Ratna Deva and Pṛithví Deva, both occur three times, and Jájalla Deva occurs twice. Coins (gold, silver and copper, see *Archæological Survey Reports*, Vol. X, p. 25) of the Kalachuri king Gangeya Deva are known; so also gold coins of a Kalachuri king, Pṛithví Deva† (see Prinsep's *Indian Antiquities*, Vol. I, p. 292, and Thomas' *Chronicles*, No. 17, p. 19.) All these, however, are of a different type. They show, on the obverse, the figure of Durgá, seated to front. No coin of any other Kalachuri king has become known before the finds now described by me. Gangeya Deva's date is about 1120–1140 A. D. There is an inscription of his, dated in (789 K. S.) 1038 A. D.‡ He must, therefore, have been a contemporary of Ratna Deva I. General Sir Alex. Cunningham has shown (*Survey Reports*, Vol. XVII, p. 71) that a Kalachuri king Gayakarṇa Deva was reigning in (866 K. S., or) 1115 A. D., in the very same year as Jájalla Deva I; and that, therefore, there existed two distinct kingdoms of Chedi, the one having its capital at Tripurí, on the Narbada, in Western Chhatisgaṛh; the other in Ratanpur, in Northern Chhatisgaṛh. Gangeya Deva was a king of Western

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* Archæolog. Survey Reports, Vol. X, p. 25.

† That this is the Kalachuri Pṛithví Deva, and not a Chandel king, is shown by the form of the name. The Chandel is called Pṛithví Varmma.

‡ Archæolog. Survey Reports, Vol. XXI, p. 113.

Chhatisgaṛh or Dahal; he is called so in one of his inscriptions (*Archæolog. Survey Reports*, Vol. XXI, p. 113). It may be suggested, that the two Chedi kingdoms had coinages of distinct types. Western Chedi had the four-armed seated Durgá, while Northern Chedi had the coins which I have described in this paper. In that case the Pṛithví Deva, whose coins show the Durgá device, would not be identical with any of the three Pṛithví Devas in the list above given, which is a list of the Ratanpur kings of Northern Chedi. He would be another king of the Tripurí dynasty of Western Chedi.

(C) COINS OF THE SULTÁNS OF DELHI.

1. See Plate IX, fig. 23. This is a copper coin of uncertain attribution, which I discovered among the coins of the Asiatic Society of Bengal. It is clearly dated 841 H., and it shows the type current in those days in the mints of the so-called Paṭhán Sultáns of Delhi. Compare, *e. g.*, the small copper coins of Mubárak Sháh II (824–837), and Muḥammad Sháh IV (837–847). It bears, however, the name of Jalál Sháh. There is no Sultán of that name in the known list of the Sultáns of Delhi. Thomas, in his *Chronicles of the Pathan Kings of Delhi*, p. 375, mentions a Jalál Lodí, who was a brother of Ibrahím Lodí, and who was placed by the nobles of his own tribe of Lodí on the throne of the kingdom of Jaunpur. But Ibrahím's date is 923–937, and his brother Jalál's date is therefore too late for the present coin. The first known interference of the Lodís with the Delhi Saltanat is connected with Bahlol Lodí, the grand-father of Ibrahím Lodí and of the above-mentioned Jalál Lodí. He was nominally Governor, but virtually, master of the dependencies of Láhor and Sarhind, under the Sultán of Delhi, Muḥammad Sháh IV bin Faríd (837–847). His aid was called in by that Sultán, to relieve him from the attack of Ibrahím, king of Jaunpur. This happened before 844, the date of Ibrahím's death. Bahlol's first mention, therefore, goes back to at least 844 H. (See Thomas, *ibid.*, pp. 320, 336). It might be suggested that Jalál may have been Bahlol's father; but his father's name is given as "Málik Kálá" in Beale's *Oriental Biographical Dictionary*. I referred the question to Mr. Rodgers, who possesses an unrivalled acquaintance with the Muhammadan coins of that period; but he was not able to throw any light on Jalál Sháh's identity. The coin reads as follows:—

Obverse:	Reverse:
فتح الدنیا	جلال شاه
و الدین	فی
۸۴۱	سلطا

I give the obverse legend, as Mr. Rodgers reads it, though I am not fully satisfied as to its correctness.

2. See Plate IX, fig. 24. This is a rupee of Sher Sháh from my own cabinet. It is of a well-known type, but I publish it for the sake of the strange reverse legend علاالدین *'Aláu-d-dín*, which is clearly shown in the bottom segment. It appears in the place, where one usually finds Sher Sháh's name *Faridu-d-dín.* I cannot account for this anomaly, nor can Mr. Rodgers to whom I referred the coin.

(D) COINS OF THE MUGHAL EMPERORS OF DELHI.

1. See Plate IX, fig. 24. This is a square rupee from my own cabinet. The date is perfectly distinct, 1010 H., and the coin, therefore, refers itself to Akbar's reign; yet its true attribution is not without difficulties. I referred the coin to Mr. Rodgers, who informed me that there are two coins like it in the Lahore Museum and that he possesses one specimen himself. He believes that they are "Jahangír's coins with Akbar's name, struck in Bengal." He reads the legends as follows :—

Obverse :	Reverse :
The Creed.	شاه سلیم ١٠١٠
	اکبـــــر
	کا بروس ضرب
	ســـــــکه
	بنگاله ......

He tells me that "Akbar," "Sháh Salím" and mint "Bangálah" are plain on one of the above-mentioned three coins. Jahangír succeeded his father Akbar in 1014 H.; his earlier name was Salím Sháh, which appears on some of his early coins, for which see British Museum Catalogue, Nos. 288, 289.

2. See Plate IX, fig. 25. This is a rupee of Jahangír, of the well-known type of the months of the Ilahí years. I publish it, however, for the sake of the mint Rohtás, which is a new one. The legends run as follows :—

Obverse :	Reverse :
اکبر	ماه اسفندارالهی
شاه شاه	ضرب ١٩ رهتاس
نگیـــر	
نور الدین جها	

3. See Plate IX, fig. 26. This is a new variety of the well-known type of Sháh Jahán's rupees with two straight-lined square areas. The novelty is that the square is made with double lines, resembling in this respect a certain variety of Sher Sháh's rupees, which is less rare, and a specimen of which is figured in the British Museum Catalogue, No. 544. Sháh Jahán's rupee of this variety is extremely rare. I have only heard of one other specimen, through Mr. Rodgers who informs me that he has seen it in the collection of Mr. Durkee, an American who visited India in the course of last year. The legends are the usual ones; there is, however, one peculiarity, that the Hijra date is given twice, while the Jalús year is omitted. The date is 1056, and is given in the top segment of the obverse, together with the mark of a "sword;" and it is given again in the bottom segment of the reverse with the mint Kaṭṭak (کٹک).

Postscript: The above was in print before I discovered that Jalál Sháh's coin (p. 243) had been already published in the Appendix to the British Museum Catalogue of "The Muhammadan States," No. 500, p. 168, among the "unidentified" coins. In a footnote, it is suggested by the author of the Catalogue that it belongs to the Gujarát group of coins, on the ground that it is "precisely similar" to the coins of Aḥmad I of Gujarát. It seems to me that the similiarity is much more striking to some of the Delhí emperial issues, and that, therefore, the prince who issued these coins was more likely to have been one who "made himself temporarily independent" from a Delhi emperor than from a Gujarát king. The facsimile of the Brit. Mus. specimen confirms Mr. Rodger's reading of the obverse legend.

On a new find of old Nepalese Manuscripts.—By Pandit Hara Prasád Shástri.

I have been fortunate enough to obtain through the good offices of my friend Bábú Kshírod Chandra Ráy Chaudhuri, Headmaster, Chapra Zilla School, a collection of ancient Sanskrit MSS. from Nepal. They are twelve in number, eleven of which have been acquired for Government. Five of them are Buddhist works, four of which are absolutely unknown to the learned world. Six of them are Hindu works, five of which are well-known; one only being new to the world. The twelfth work was marked unknown and appeared to be in utter confusion. The great merit of the five Hindú MSS. which are already well-known, and indeed that of the whole collection, is their ancient date. The MSS. were written between 1026 and 1481 A.D.

The most important works of this collection are two; namely, a commentary on the celebrated work on Buddhist philosophy entitled *Bodhicharyávatára*, noticed by the late Rájá Rájendralál Mitra on page 47 of his work on the Nepalese Buddhist MSS. Mr. Bendall in his "Cambridge Catalogue" says that this work is the 9th Section of the well-known *Aśokávadánamálá*. It is divided into 10 chapters, and is perhaps the only work in which four of the six *páramitás* have been fully explained. Though it is a part of the Aśokávadána, it is always regarded as a separate work on account of the importance of its philosophical doctrines, which are couched—as all such doctrines are—in a language scarcely to be understood without a commentary. And such a commentary is furnished in one of the twelve works in the new collection.

The commentary is by Prajñákara who is styled *Paṇḍita Bhikshu*, *i. e.*, a learned monk. Bábú Sarat Chunder Dás tells me that Prajñákara was a famous disciple of the still more famous Dípaṅkara S'rí Jñána of Vikramaśíla who introduced the reformed Buddhist faith into Tibet, where he is known as Atíshá. This is probably correct. The MS. was copied by one who, from the use of the phrase *Prajñákarapádánám*, appears to have been Prajñákara's disciple. The work was copied in the year 198 of the Nepalese era, *i. e.*, 1078 A.D., and Dípaṅkara's journey to Tibet is said to have been undertaken in the year 1066. Atíshá was about seventy when he was invited to Tibet, and it is quite possible that one of his young disciples wrote a running commentary on one of the most important works of Buddhist philosophy, and that it was copied by a pupil of this disciple.

As a specimen of the commentary, I subjoin an extract from page 213A to the end:—

Text अजरामरलीलानामेवं विहरतां सताम् ।
आयास्यन्त्यापदो घोराः कृत्वा मरणमग्रतः ॥ P. 45, a. B. 42.

Comm. अजर इत्यादि। न विद्यते जरा जीर्णता येषां तेऽजराः। न म्रियन्ते येऽमराः। तेषामजराणाममराणामिव लीला विचेष्टितं येषां ते तथोक्ताः तेषामेवमनया लीलया विहरतां निश्चितं विचरतां सतामायास्यन्ति ढौकिष्यन्ति। आपदो निरन्तरं सर्वे ते दुःखहेतवो जराव्याधिविपत्तयः। घोरा अतीवभयङ्कराः कथमायास्यन्ति। कृत्वा मरणमग्रतः। मरणमप्रतीकारपरिहारं मृत्युमग्रतः पुरतः कृत्वा। एतच्चोक्तं भगवता राजाववादसूत्रे, तद्यथा, महाराज चतसृभ्यो दिग्भ्यश्चत्वारः पर्वता आगच्छेयुः दृढाः सारवन्तः अखण्डाः अच्छिद्राः असुषिराः सुसंहताः एकप्राणाः नभःस्पृशन्तः पृथिवीञ्चोल्लिखन्तः सर्व्वंतृणकाष्ठशाखापर्णपलाशादि

सर्व्वसत्त्वप्राणभूतान् निमथ्नन्तः तेभ्यो न सुकरं जवेन वा पलायितुं बलेन वा द्रव्यमन्त्रौषधैर्व्वा निवर्त्तयितुं। एवमेव महाराज चत्वारि इमानि महाभयानि आगच्छन्ति। येषां न सुकरं जवेन पलायितुं बलेन वा द्रव्यमन्त्रौषधैर्व्वा निवर्त्तयितुं। कतमानि चत्वारि जरा व्याधिर्मरणं विपत्तिश्च। जरा महाराज आगच्छति यौवनप्रमथ्यमाना, व्याधिर्महाराज आगच्छति आरोग्यं प्रमथ्नन्, मरणं महाराज आगच्छति जीवितं प्रमथ्यमानं, विपत्तिर्महाराज आगच्छति सर्व्वाः सम्पत्तीः प्रमथ्नन्ती। तस्माद्धेतोः। तद्यथा महाराज सिंहो मृगराजो कायसम्पत्तीर्जवसम्पत्ती ·········· जातनखदंष्ट्राकरालो मृगगणमनुप्रविश्य मृगम् गृहीत्वा यथाकामकरणीयं करोति स च मृगराजोऽतिबलं ·· घातमुखमासाद्य विवशो भवति। एवमेव महाराज विद्धस्य मृत्युशल्येनापगतमदस्यात्राणस्याप्रतिशरणस्यापरायणस्य मर्म्मसु छिद्यमानेषु मांसशोणिते परिशुष्यमाणे परिटषितविकृतवदनस्य करचरणविक्षेपाभियुक्तस्याकर्म्मण्यस्यासमर्थस्य लालासिंधानकपूयमूत्रपूरीषपरिलिप्तस्य ईषज्जीवितावशेषस्य कर्म्मभवात्पुनर्भवमालम्बमानस्य यमपुरुषभयभीतस्य कालरात्रिवशगतस्य वरमाश्वासप्रश्वासेषु पूरकप्रमाणेष्वेकाकिनोऽद्वितीयस्यासहायस्य इमं लोकं जहतः परलोकमाक्रामतो महापथं व्रजतः महाकान्तारं प्रविशतः महागहनं समवगाह्यमानस्य महाकान्तारं प्रपद्यमानस्य महार्णवेनोह्यमानस्य कर्म्मवायुना नीयमानस्य निमित्तीकृतां दिशं व्रजतो नान्यत्त्राणं नान्यच्छरणं नान्यत्परायणं ·· ते धर्म्माधर्म्मौ हि महाराज तस्मिन् समये त्राणं लयनं शरणं भवति। तद्यथा शीतार्त्तस्याग्निप्रतापः, अग्निमध्यगतस्यापि निर्व्वापणं, उष्णार्त्तस्य वा शैत्यं, आधानं प्रतिपन्नस्य सुशीतलच्छायोपवनं, पिपासितस्य सुशीतलं सलिलं, बुभुक्षितस्य वा प्रणीतमन्नं, व्याधितस्य वा वैद्यौषधिपरिचारकाः, भयभीतस्य बलवन्तः सहायाः साधवः प्रतिशरणा भवन्तीति विस्तरः। तस्मादेतत् भयपरीहारार्थं कुशलपक्षेष्वेव प्रज्ञापरिशोधितेषु यत्नः करणीयः।

एवं दुःखाग्नितप्तानां शान्तिं कुर्य्यामहं कदा।
पुण्यमेघसमुद्भूतैः सुखोपकरणैः स्वकैः॥ P. 45, b. B. 42.

इदानीं जात्यादिदुःखखिन्नानां दुःखापहरणाय स्वाशयमाशङ्कयन्नाह, एवमित्यादि एवमनन्तरोक्तया नीत्या दुःखाग्नितप्तानां दुःखान्येवाग्नयः तैः सन्तापितानां सत्त्वानां शान्तिं जात्यादिदुःखानलतापप्रशमनं कुर्य्यामहं कदा

कस्मिन् काले कुर्य्यां विदध्यां । कथं सुखोपकरणैः स्वकैः सुखस्योपकरणानि सुखसाधनानि वस्त्राभरणानुलेपनशयनासनप्रभृतीनि । किन्तदुपार्ज्जितैरेव नेत्यादि, स्वकैः स्वात्मीयैः मया स्वयमुपार्ज्जितैरित्यर्थः । किं निर्म्माणादिप्रदर्शितेनेत्याह पुण्यमेघसमुद्भूतैः । पुण्यान्येव मेघाः सर्व्वदुःखसन्तापार्त्तिशमनसुखोपकरणशीतलवृष्टिप्रदाननिदानत्वात् । तेभ्यः समुद्भूतानि जातानि तैः ।

कदोपलम्भदृष्टिभ्यो देशयिष्यामि शून्यताम् ।
सम्वृत्याऽनुपलम्भेन पुण्यसम्भारमादरात् ॥ P. 45, b. B. 42.

एवमभ्युदयसम्पदि परेषां चेतो विधाय निःश्रेयसम्पदि प्रदर्शयन्नाह ।

कदेत्यादि । कदा कस्मिन् काले उपलम्भदृष्टिभ्यो भावग्राहाभिनिविष्टेभ्यो देशयिष्यामि प्रकाशयिष्यामि शून्यतां सर्व्वधर्म्मनिवृत्तिरूपावहारेण । अन्यथा विकल्पाविषयतया परमार्थशून्यस्य शून्यताया देशयितुमशक्यत्वात् एवं निःश्रेयसहेतुज्ञानसम्भारनिमित्तमुपदर्शितं तत्कारणं पुण्यसम्भारनिदानमुपदर्शयन्नाह । पुण्येत्यादि । पुण्यस्य दानादेः सम्भारो··············दृष्टिभ्यो देशयिष्यामि इति सम्बन्धः । आदरादिति महता । गौरवेण । संवृत्य न यदृच्छया केन प्रकारेण अनुपलम्भेन देयदायकप्रतिग्राहकादित्रितयानुपलम्भयोगेन त्रिकोटिपरिशुध्यति यावत् एवमुपचितपुण्यसम्भारो बुद्धत्वाधिगमाय जायते तदेवमनेन सर्व्वेनाशेषसंक्लेशहेतु सर्व्वसमारोपविकल्पप्रतिपक्षतया सर्व्वावरणप्रहाणोपायत्वात् समस्ततथागताधिगमहेतुत्वाच्च । सर्व्वदुःखोपशमोपायप्रज्ञोपजायते इत्युपदर्शितं भवतीति ।

ये गम्भीरनयावगाहनपटुप्रज्ञानिरस्तश्रमाः
संक्लेशव्यवदानपक्षविमलज्ञानोज्झिताः शूरयः ।
ते सन्तो गुणदोषयोरपि च तैः सारं विमिश्रादतो
ग्राह्यं सर्वमकल्मषं विषमिव त्याज्यं दुरुक्तं यदि ॥
न युक्तमुक्तं किमपीह यन्मया परं प्रजातं स्खलितं तदेव मे ।
ननु ग्रहीष्यन्ति ममात्र साधवो मतिर्म्ममानेन कृतेन साम्प्रतं ॥

अपि च ।

यः संवृत्या व्रजति मनसो गोचरत्वं कथञ्चित्
तादृश्यर्थे स्खलति न मतिः कस्य वै मादृशस्य ।
तत् सूक्तार्थप्रविचयवतामध्यमानीतिभाजाम्
दृष्ट्वा किञ्चिद्गुणलवमिह स्यादुपादेयबुद्धिः ॥

प्रज्ञया विवृतिं विधाय विशदव्याख्यापदैः संवृतं
सम्यक्ज्ञानविपक्षदृष्टिविचितव्यामोहशान्त्या मया ।
यत् पुण्यं समुपार्ज्जितं हितफलं तेनास्तु सर्व्वो जनो
मञ्जुश्रीरिव सद्गुणैकवसतिः प्रज्ञाकरो जायतां ॥

बोधिचर्य्यावतारे प्रज्ञापारमितापरिच्छेदटीका समाप्ता । कृतिरियं पण्डितभिक्षु प्रज्ञाकरपादानां ।

टीकेयं परमां स्वयन्वितपदां शुद्धां मनोज्ञादिनीं
संसारार्णवपारगामिनि जने नौयानयात्रोपमां ।
आशुप्राप्तिकरीं जिनस्य पदवीं साद्योल्लिखिता मया
प्राप्तं यत् कुशलं सुसम्पदिपदं तेनास्तु बुद्धो जनः ॥
अष्टानवतिसंयुक्ते शतसप्तति वत्सरे ।
कृष्णे श्रावणपञ्चम्यां वासरे कुजसाह्वये ॥
श्रीमच्छङ्करदेवस्य राज्ञो विजयशालिनः ।
बोधिचर्य्यावतारस्यटीकालिख्यामिदं शुभं ॥
श्रीललितपुरे रम्ये श्रीमानीश्वलसंज्ञके ।
यच्छ्रीराघवनाम्नस्य विहारे सुगतालये ॥
धन्य स्थविरभिक्षोस्य बुद्धचन्द्रस्य पुस्तकं ।
तत् पुण्याद्बोधिसत्त्वत्वं लभते परमं पदं ॥ इति
विसृजतु सलिलं घनो यथेष्टं भवतु मही बहुशस्य संप्रयुक्तं ।
अवतु नरपतिः प्रजा विनाश्याः भवतु रयनपतेः सुखाभिवृद्धिः ॥ इति ।
कायस्थः भुवनाकरषेण लिखितमिति ।

The commentary comes down to the end of the 9th chapter of the *Bodhicharyávatára*, the chapter dealing with Prajñápáramitá. The first page of the MS. is missing; others are missing here and there, and the number of missing pages is about 29.

The second important work is a complete copy of the Chándra-vyákaraṇa which represents one of the eight great schools of Sanskrit grammar as stated in the celebrated verse:—

ऐन्द्रचान्द्रः काशकृत्स्नापिशलीशाकटायनः ।
पाणिन्यमरजैनेन्द्रा जयन्त्यष्टादिशाब्दिकाः ॥

A complete copy of this book is a great desideratum. Mr. Bendall's catalogue of MSS. in the University Library of Cambridge mentions two MSS. of this work, but both of them are incomplete. Our MS. was transcribed in the Nepal year 476 corresponding to 1356 A.D., and the palæography exactly corresponds with that of the 14th century as given in Mr. Bendall's Tables of letters and numerals. It was written at a time when all Nepal was in a state of confusion, owing to a Kośala invasion led by Hari Singh of Simraon. The MS. was copied by Kshemendra, the principal *Ácharya* of a *Vihár* named Yosváccha (?), in the reign of Rájádhiráj-parameśvara-parama-bhaṭṭáraka-śrí-śrí-vijaya-rája-deva—a king whom it is very difficult to identify. Mr. Bendall is perfectly right when he says that "the *Chandra-vyákaraṇa* follows Páṇini both in style and treatment and often in actual words, many of the Sútras being identical." This is also the case with many other grammars, some of which have been compiled simply to avoid the study of the cumbrous and diffuse Páṇini. Mr. Bendall also says that the *Chandra-vyákaraṇa* is divided into six *adhyáyas*, each of which again is sub-divided into four *padas*, though in my MS. the 6th *adhyáya* contains 3 *padas* only.

The next work in importance is a complete copy (one leaf only missing) of the *Amara Kosha* written in the month of Chaitra in the 24th year of Govindapála Deva whose accession to the throne of Magadha in the year 1161 is known from an inscription in Vol. III of Cunningham's Archeological Report. Thus his 24th year corresponds with 1185 A.D. I have compared portions of the MS. with the printed text of Colebrooke. In the printed text there are metrical colophons at the end of every *káṇḍa*. But the MS. has no metrical colophons. The last colophon of the MS. is simply *Liṅga-saṁgrahaḥ samáptaḥ.*

Many lines and verses, which are known in latter MSS. as interpolations, do not occur in our MS.—for instance, the synonyms of Lakshmí occupy two lines in ordinary MSS. and printed texts of the Amara Kosha, whereas our MS. has only one line; and many old pandits whom I consulted, and who in their early youth committed the whole of the work into memory, told me that the second line was always regarded as an interpolation.

The fourth work is a copy of the Chaṇḍakauśika by Árya Kshemiśvara, dated 1331, A.D.* So the writing of this work also falls within the period of confusion in Nepal. The Sanskrit scholarship of Nepal at that time was so poor that they could not correctly ascertain the name of the work, but labelled it, in the same character in which the whole book is written, as *Hariśchandra-vikríya-pustakam.*

* चन्द्रेष सागरे वर्षे नैपाली शनिवासरे
पौषेन्दुवृद्धि सप्तम्यां शुद्धं श्रीरामदासतः।

Five leaves, from *three* to *seven*, are missing. The book is in other respects complete, and it affords many readings which are much better than those found in the Calcutta editions of the work.

The book contains some hints about the time when it was composed in the following couplet :—

यः संश्रित्य प्रकृतिगहनामार्य्यचाणक्यनीतिम्
हत्वा नन्दान् कुसुमनगरं चन्द्रगुप्तो जिगाय
कर्णाटत्वं ध्रुवमुपगतानद्य तानेव हन्तुम्
दोर्दर्पाढ्यःसपुनरभवत् श्रीमहीपालदेवः ॥

Mahípála has been put down by Cunningham as the 11th king of the Pála dynasty whose reign commenced in the year 1015. But the question is who the Karṇáṭas, mentioned here, were? Are they the people of Karṇáṭa, or do they belong to the dynasty of Karṇáṭas who reigned in Mithila and Nepal for a long time in the next two centuries. On page 99, Vol. I. of South Indian Inscriptions, Dr. Hultzsch speaks of a Mahípála Deva whose dominions extended to the sea, and from whom eleven elephants were wrested by Rájendra Choṛa Deva of the Súryavaṁśa, who reigned from A. D. 1022 to 1063. This is Mahípála of Magadha, who reigned from 1015 to 1040. The Pálas made extensive conquests at this period of their existence. One of their dynasty has been placed by Albiruni on the throne of Kanauj about this period, 1020. There is every probability of the Mahípála mentioned in Chaṇḍakauśika being the same person as the Mahípála of 1015 to 1040. He had to fight with a South Indian Prince—a Karṇáṭa. The Karṇáṭas were the enemies of Hemanta Sena the great grand-father of Ballála Sena. Hemanta retired to a place on the Bhágírathí, in Bengal, after a life-long contest with the Karṇáṭas, and his grandson, Vijaya, is said to have defeated Nánya Deva, the founder of the Karṇáṭaka dynasty of Nepal. (Epigr. Ind., Vol. I.). These reigned in Nepal for several generations (see Bendall's Catalogue) and the Maithila King under whose patronage Chaṇḍeśvara wrote his Smṛiti works and led his victorious armies to Nepal, also belonged to the Karṇáṭaka dynasty. (See Eggeling's Cat. I. O. L. MSS.)

The work was very popular at Mahípála's court where a nobleman named Kártika gave the author *Árya Kshemíśvara* a large quantity of gold, silver, and land, as appears from the last verse.

येनोद्दिश्य प्रयोगं घनपुलकभृता नाटकस्यास्य हर्षात्
वस्त्रालङ्कारहेम्नामनुदिनमकृशा राशयःसम्प्रदत्ता

तस्य चत्रप्रसूते भ्रंमतु जगदिदं कार्त्तिकेयस्य कीर्त्तिः
पारे क्षीराम्बुधिन्धोरपि कवियशसा सार्द्धमग्रेसरेण ॥

A drama describing the self-sacrificing spirit of Hariśchandra cannot but be interesting to a Buddhist audience.

The fifth work is *Suddhiratnákara*, by Chaṇḍeśvara. The work has been noticed by the late Rájá Rájendralála Mitra in his *Notices of Sanskrit Manuscripts*, Vol. VII, No. 2384, as belonging to one Bhaiyálála Jhá, of Dhamdaha-grám in Purnia. The India Office Library has a very imperfect copy of the work, in which both the beginning and the end are missing. The MS. is one of the seven great works of Chaṇḍeśvara's digest. Pages 2, 3, 6, 7, 8, 9, 10, 39, 77, and some leaves at the end, in our MS. are missing. The MS. is a much better one than the India Office copy, which is in modern Bengalí characters; while ours is in ancient Bengalí, and may, on palæological grounds, be referred to the 14th century.

The sixth work is *Buddha-kapála-ṭiká*. This is a commentary on the Buddhakapála—a Buddhist tántric work not yet obtained. The MS. was copied by a pupil of the author—Abhayákara, a monk belonging to the Vihára of Vikramaśíla. The work is complete in 14 *paṭalas*. The name of the commentary is Abhaya-paddhati. On palæographical grounds the work may be referred to the palmiest days of Vikramaśíla, in the 11th and 12th centuries of the Christian era.

The seventh work is *Saṅgíta-ratnákara*, in ancient Bengalí character, dated लसं 362, *i. e.*, 1481 A. D. The work is complete in three chapters, and deals with instrumental and vocal music and dancing. It has marginal notes in Nepalese handwriting. It has already been printed and published at Calcutta.

The eighth is *Samputodbhava*, written in Buddhist Sanskrit prose in the style of the *Prajñápáramitá*. The MS. is complete, the first two pages are slightly injured, so portions of them are mounted with paper in which the injured portions of the text have been restored in a later hand. It is a Tántric work consisting of ten chapters, each divided into three to four *prakaraṇas*. It was copied in 146 of the Newarí era, *i. e.*, 1026 A.D.

The ninth work is *Vajraḍák-tantra*. This is a Tántrik work in 51 *paṭalas*, treating of mystic *mantras* and mystic observances. The invocation of serpents, Ḍákinís, dead bodies, &c., forms the chief feature of the work. The work is incomplete and breaks off with the 225th leaf.

The tenth work of the collection is a beautiful copy of the *Prajñápáramitá* in 8,000 *ślokas*. The work is on palm leaves pressed between two wooden boards, with sticks inserted through holes in place of strings. One of the boards is besmeared with sandal paste, which has accumulated there for ages. The MS. was evidently an object of worship and as *Prajñápáramitá* is also called *Rakshá-Bhagavatí* it appears to have been regarded as a charm for protection against evils. The MS. was copied in the 38th year of Govindapála who is styled Gauṛeśvara, *i. e.*, the year 1198 A.D. Govindapála had certainly lost his kingdom before that time, because his kingdom is not mentioned as a *pravardhamána-vijaya-rájya*, as usual, but as an *atíta-rájya*, *i.e.*, that his kingdom was lost but he was living, perhaps a fugitive. Three of the MSS. belonging to the same reign have been examined by Mr. Bendall at Cambridge. In one of them, that belonging to the 38th year of this reign, occurs the word *vinashṭa-rájya*, showing that the kingdom was lost at that time. The word used in our MS. is *atíta*, which is the same as *vinashṭa*. The book was copied at Jayanagara in Magadha Maṇḍala at a Vihára established by Ráṇí Khetallya Deví by Jainácharya S'ríkamalapála. It was a gift by a lay disciple belonging to the Maháyána School named Maluka (?), the son of Maharohasoshṭane (?). Jayanagara at this time was a sort of second capital of Magadha. Cunningham says it was situated near Laskhmíserai. That it was a place of importance is testified by two facts: (1) by the discovery of a number of inscriptions in the 12th century character, and (2) by a number of coins in the Indian Museum, belonging to this place. The rulers of Jayanagara seem to have held a semi-independent authority under the Pálas. Govinda Pála in this MS. is called the king of Gauḍa; this was a mere title. He had no authority in that city which was under the power of the Senas, and Lakshmaṇa Sena is said to have changed its name into Lakshmaṇávatí, and one of his inscriptions is dated from Pauṇḍravardhana, which is by many and, indeed, by the late Mr. Blochmann, identified with Hazrat Paṇḍua, so near Gauḍ.

I have compared the first few leaves with the printed text of Dr. Rájendralála Mitra, and I found them to agree perfectly. This work has not been acquired.

The eleventh MS. is a collection of S'aiva tantras. On a careful examination of the whole MS. it appears to be a collection of six S'aiva works. (1) S'ivapadma, 12 complete chapters, (2) S'ivapadmottara, complete in 12 chapters, (3) S'ivapadma Saṁgraha, complete in 12 chapters, (4) Umá Maheśvara Saṁváda, 21 chapters, not complete. Works of this name, belonging to the Skanda and to the Linga Puráṇas, are mentioned in Aufrecht's Catalogue, but there is no good notice of these works. (5) S'ivopanishad, complete in eight chapters. This is different from the S'ivopanishad by Harihar, noticed by Rájendralála Mitra. (6) Uttarottara Tantra, complete in 10 chapters. The work can safely be placed on paleographic grounds in the 12th century.

The twelfth MS. is labelled as unknown. The first page is missing and the end is far away. On examination it is found that pages from 2 to 210 exist, with the exception of the 129th page. The handwriting is beautiful, much older than the rest of the collection. On examination it proved to be a portion of the Vṛihat-kathá, about a-tenth of the whole work. It is not Somadeva's *Kathá-Saritságara*, nor Kshemendra's *Vṛihat-Kathámañjarí* because in both these works the chapters are divided into *lambakas* and *taraṅgas*, whereas in the present MS. it is divided into *adhyáyas* and *sargas*. The work contains one complete *adhyáya* and a portion of the second. It has altogether 26 *sargas*, the colophons of many of which do not give any information at all. But in some of them appear these significant words *Vrihatkatháyám-śloka-saṁgrahe.* In the colophons appear the names of the *sargas;* they often contain proper names, none of which I have been able to identify either in Kshemendra's or in Somadeva's work. So this fragment appears to be a third Sanskrit redaction or version of the original Paiśáchí Vṛihat-kathá by Guṇáḍhya, and the MS. which has been labelled 'unknown' by my Nepalese vendor, turns out to be the most important work of the whole collection.

The letter क in this MS. has a more archaic form than in most of the Nepalese MSS., which leads me to think that this MS. is of higher antiquity than the rest. The क has the turn of the Guptalipi. I may therefore be allowed to venture to say that I have laid my hands on a work copied even before Kshemendra and Somadeva wrote their works on the Vṛihat-Kathá. Bühler, in his paper in Vol. I, Ind. Ant., says that Kshemendra had the Paiśachí version of Guṇáḍhya before him. Might not he have consulted a big Sanskrit version, too, from which to abridge? I have read the first *sarga* in my MS. It treats of king Gopála renouncing the world, because people calumniated him as a parricide, and making over his kingdom to Pálaka, his brother, in spite of the remonstrances of the Bráhmans. This is a very large work, the first *adhyáya* alone containing more than 4,200 *ślokas.* While Kshemendra's whole work, according to Bühler, consists of a little more than 7,000 *ślokas.* I give here the colophons of this work.

	पत्राङ्काः।
वृहत्कथायां श्लोकसंग्रहे प्रथमः सर्गः	५
द्वितीयः सर्गः	८
वृहत्कथायां श्लोकसंग्रहे कथामुखम् तृतीयम्	१५
पिङ्गलिकाख्यानं	२१
दोहदसम्पादनो नाम सर्गः	३६

	पत्राङ्का।
कुमारजन्म सर्गः	३८
यौवराज्याभिषेकः सर्गः	४२
मृगयाविहारः सर्गः	४५
पुलिनदर्शनः सर्गः	५०
कथासंलापो नाम सर्गः	६३
श्लोकसंग्रहे मदनमञ्जुकालाभः	६८
वेगवतीलाभे उद्याननिचयो नाम द्वादशः सर्गः	७२
वेगवतीदर्शनो नाम त्रयोदशः सर्गः	७५
बृहत्कथायां श्लोकसंग्रहे वेगवतीदर्शनं नाम चतुर्दशः सर्गः ...	८१
वेगवतीलाभो नाम पञ्चदशः सर्गः	८८
गन्धर्वदत्तालाभरम्यप्रबन्धो नाम षष्ठदशः सर्गः	९२
गन्धर्वदत्ताविवाहः	१००
बृहत्कथायां श्लोकसंग्रहे सानुदासकथा	१३०
इति बृहत्कथायां श्लोकसंग्रहे अजिनमतीलाभे नलिनिकाख्यानं ...	१३९
प्रियदर्शनलाभदेवाख्यानं	१६८
पुरुषकारकथायां प्रथमोऽध्यायः	१७४
प्रियदर्शनालाभे पुरुषकारकथा	१८२
प्रियदर्शनालाभे नन्दोपनन्दकथा	१८६
प्रियदर्शनालाभे गोमुखविवाहाख्यानम्	१९७
प्रियदर्शनालाभे प्रियदर्शनास्तनदर्शनः	२००
प्रियदर्शनविवाहः	२०६

Note on the Official Reckoning of the reigns of the later Moghul Emperors and on some of their Mint Towns.

By W. Irvine, Esq., I.C.S. (retired.)

In the Philological Secretary's Report on a recent find of coins (Proceedings for June 1893, p. 116), I see that he adopts 1069 Ḥ. (Sept. 1658—Sept. 1659), as the year from which Aurangzíb 'Alamgír's reign is reckoned. On grounds which I think are overwhelmingly strong, I propose to substitute 1068 Ḥ. (Sept. 1657—Sept. 1658.)

Among European writers we find considerable difference of opinion as to the year in which 'Alamgír began his reign. To mention the latest writer first, Mr. S. Lane Poole, in his "The Moghul Emperors of Hindustan" (1892), p. xxvi, says "in May 1659 (1069) he," *i.e.*, 'Alamgír, "was proclaimed Emperor." I see, however, that in his later work "Aurangzíb" (1893) in the series "Rulers of India," Mr. Lane Poole dates the reign from July 1658 (see the Table on p. 21 of that work). Again, in the "Oriental Biographical Dictionary" of T. W. Beale, p. 33, we read "but ('Álamgir) was not crowned till the first "anniversary of his accession, a circumstance which has introduced "some confusion into the chronology of his reign." This statement, in identical words, is found in Elphinstone's "History of India" (4th ed. p. 525), and he relies on Kháfí Khán. Grant Duff ("History of the Mahrattas," Bombay reprint, note on p. 72), although he prefers 1658 (*i.e.*, 1068 Ḥ.) to 1659 as the correct year, seems to have suggested Elphinstone's remark. Grant Duff writes "Aurungzebe appears to "have begun by reckoning his reign from the date of his victory over "Dara, to have subsequently ascended the throne in the following year, "and then changed the date, which he again altered by reverting to "the former date (*i.e.*, 1068 Ḥ.) at some later and unknown period." Grant Duff, like Elphinstone, relies upon Kháfí Khán. Now, Kháfí Khán (in the printed text, at any rate) is not to be altogether trusted in the matter of chronology; but I think that in this instance Grant Duff's note misrepresents the facts, even as recorded by Kháfí Khán.

Kháfí Khán founded his statements, as is tolerably obvious, on the *Táríkh-i-dahsálah* or *'Alamgír-námah* of Muḥammad Káẓim, and on the *Ma,áṣir-i-'Alamgírí* of Muḥammad Sáḳí Musta'id Khán. The latter for the first ten years of the reign is itself an abstract of Muḥammad Káẓim's work (see p. 65 of the printed text of the Ma,áṣir). The facts, then as related in the *'Alamgír-námah*, the source from which all others are drawn, are as follows:—

Muḥammad Káẕim commences the second year (1069 Ḥ.) with a long excursus on the necessity for a system of chronology and the varying modes of reckoning time, with some remarks on Akbar's Divine Era and that followed by Jaháugír. Those two sovereigns reckoned from the 1st Farwardín and used a solar year. He then informs us that Sháhjahán restored the use of the Muhammadan era; and that 'Álamgír followed his father's practice. "And although the first fortunate enthronement happened on the 1st Ẕú,l-ḳa'dh, 1068 Ḥ; yet, the effulgence of victory and success and the rising of the world-illuminating light of that founder of the horoscope of felicity and prosperity having thrown the ray of joy on the world in the month of Ramẓán of their year (1068 Ḥ ?), and the appearing of the star of strength and perpetuity of that chosen one, full of splendour, having lighted up the face of Fortune and Good Luck in those days; the first day of that month of blessed omen, which was the new moon of limitless felicity and pregnant with both worldly and spiritual blessings, was chosen as the first day of the years of that reign, rich in mercies; and the exalted order obtained issue that in offices and calendars and patents and rescripts, they should make record after that manner, and reduce into writing after that fashion all occurrences and the reports of events. Accordingly, by the rule so fixed, I have to this point written with my descriptive pen the story of one year and twenty-four days belonging to the felicitous epoch of the sovereignty and empire of that One worthy of the faith-protecting throne. And previous thereto there are entered the events of four months belonging to the auspicious time of his being still only a Prince of the Blood, beginning from the day of the departure of the victorious army, intent on world-conquering and realm-seizing, from the province (k̲h̲itah) of fortunate foundation, Aurangábád, which took place on the 1st Jumádí I, 1068 Ḥ. (*in words*), ending" [*i.e.*, the said four months, Jumádí I, Jumádí II, Rajab, and Sha'bán, 1068 Ḥ.] "with the 1st of Ramẓán of that year, which is the first day of the years of that reign full of happiness. Altogether the period covered is 1 year, 4 months, and 24 days. Then will follow the second year." After this passage he goes on to the festivities held to celebrate the accession, the abolition of the *Nau-roz* festival, and the substitution of another to be amalgamated with that of the 'Íd-ul-fiṭr. Next, we have the appointment of a Muḥtasib, or Censor, as in Muḥammad Sáḳí. (*'Álamgír-námah*, B. M. Addl. MSS., Nos. 26, 229, foll. 102b. to 104a.) I have no copy of the printed text, and therefore cannot give references to it, but the passage can, I have no doubt, be very easily found.

Next in order of date comes Muḥammad Sáḳí Musta'id K̲h̲án and his *Ma,áṣir-i-ʿAlamgírí.* The parallel passage to that quoted above from the *ʿAlamgír-námah* will be found on pp. 22–25 of the printed text. But I will turn first to an earlier page as it explains the circumstances of the previous enthronement in 1068 Ḥ. ʿAlamgír determined to proceed to the Panjáb in pursuit of his brother, Dárá Shukoh. He set out from Akbarábád on the 22nd Ramẓán, 1068 Ḥ. (23rd June 1658.) The astrologers having selected the 1st Ẓú,l-ḳa'dh, 1068 Ḥ. (31st July 1658), or 11th Amardád of the Iláhi year, as the auspicious moment for his enthronement, and there being no time to proceed to the palace at Dihli and there prepare for this august act, ʿAlamgír halted for several days at the garden of Ág͟harábád [also called Shálihmár, it was just north of Dihli] to take advantage of the said propitious moment. There he seated himself on the throne of good fortune.......As the preparations for this ceremonial were on a limited scale, most of the observances of an enthronement were put off to the second anniversary (*jalús*). On this occasion no *k͟huṭbah* was read, no coinage issued, and no imperial titles fixed upon. These matters were postponed. [*Ma,áṣir-i-ʿAlamgírí*, p. 8]

[*Idem*, pp. 22–25.] Year 1069 Ḥ. This corresponds to the extract above given from Muḥammad Káẓim. "Since the ceremonial of "the first enthronement, by reason of the advance into the Punjáb and "from want of time, was on a reduced scale, while the reading of the "*k͟huṭbah*, the issue of coin, and the fixing of the imperial titles were "postponed; now that more important affairs had been arranged, orders "were issued to prepare for the festival" ...... "And on the fortunate "day, Sunday, the 24th of the blessed month Ramẓán, in the year "1069 Ḥ. (15 June 1659), or the 25th K͟hurdád of the Iláhi year, when "his age was 40 solar years, 6 months, and 17 days, or 41 lunar years, "10 months and 2 days, ʿAlamgír seated himself on the throne." The *k͟huṭbah* was read, coin issued, offerings presented, and gifts bestowed.

The Muhammadan creed was no longer to be impressed on the coin, but, instead, a distich, composed by Mír ʿAbd-ul-Báḳí, was approved. The new emperor's titles were settled; and *farmáns* issued to all provincial governors, announcing the new reign. Several chronograms for the occasion are given; these yield 1069 Ḥ. Then follow these words: "As the shining of the light of the victory diffused its felicitous rays "on the world in the month of Ramẓán, the exalted order was issued "that they should record in offices and calendars the 1st of that month "as the commencement of the years of this reign." After this comes a passage about the abolition of the *Nau-roz* festival, and the institution instead of it of a festival to be called *Nisháṭ-afroz*. It will be noticed that Muḥammad Sáḳi does not expressly state the year, from the 1st

Ramẓán of which the reign was dated. But neither he nor Muḥammad Káẓim, from whom he copies, give any countenance to a reckoning commencing with 1069 Ḥ. On p. 30 and p. 34 we find that according to Muḥammad Sáḳí, the third year (not the second) began in Ramẓán 1070 Ḥ., the fourth year (not the third) in Ramẓán 1071 Ḥ., and so on, throughout the book, to the end of the reign. For his period, the first ten years, Muḥammad Káẓim follows exactly the same rule. Finally, Muḥammad Sáḳí [Ma,áṣir-i-'Alamgírí, pp. 520 and 523] records that 'Alamgir died early on Friday, the 28th Ẓú,l-ḳa'dh 1118 Ḥ. (2nd March 1707), in the 51st year of his reign, having reigned 50 lunar years, 2 months, and 27 days. This accords exactly with the mode of reckoning laid down by Muḥammad Káẓim. For, if we calculate from the 1st Ramẓán 1068 Ḥ. to the 28th Ẓú,l-ḳa'dh 1118 Ḥ.), we get as result (1118y. 10m. 28d.)—(1068y. 8m. 1d.) = (50y. 2m. 27d.). Kámwar Khán, in his *Táríkh-i-Saláṭín-i-Chaghtaiyah*, gives the same number of years, months, and days; but I attribute to him no independent authority for this reign, having found wherever I have compared the two authors, that Kámwar Khán gives Muḥammad Sáḳí's facts, in identical order, but in different words.

I add two more extracts from Muḥammad Sáḳí, as the second of them records a slight change in the observance of the anniversary, and this may have been the reason that Grant Duff thought the date of accession had been twice altered—[*Ma,áṣir 'Alamgírí*, p. 30]. Year 1070 Ḥ. The third year of the reign commences. The anniversary ceremonies begin on the 24th Ramẓan (4th June 1660). [*Idem*, p. 34]. Year 1071 Ḥ. The fourth year commences. "Although the date of enthronement (*sarír-árái*) was the 24th Ramẓan, and in the previous year "the festival began on that day, yet owing to its falling in the time of "the Fast, when there is no inclination to enter into rejoicings, the beginning of this year's festival was fixed for the day of the 'Íd" (*i. e.*, 1st Shawwál). It lasted ten days.

Kháfí Khán's passage, parallel to those in Muḥammad Káẓim's *'Alamgír-námah*, and Muḥammad Sáḳí's *Ma,áṣir i 'Alamgírí*, will be found in the Bibliotheca Indica Text, Vol. II pp. 76–79. As it is translated, nearly in full, by Dowson in Elliot's *History of India*, VII, 241, I need not reproduce it here. I only note that Dowson's "4th Ramẓán" is the 24th Ramẓán in the printed text. Although Kháfí Khán here expands rather than contracts what Muḥammad Káẓim wrote, it is strange that he omits the all-important statement that the reign was made to begin on the 1st Ramẓán. I have looked through the text on pp. 76–80, and I cannot find any mention of this fact. Kháfí Khán, II, 549, gives the length of the reign as 50 years, 2½ months; and even these figures, though not strictly accurate, preclude any reckoning from 1069 Ḥ., but carry the first day into 1068 Ḥ.

Again, I find in a somewhat later writer, Khushál Chand, author of the *Nawádir-uz-Zamání*, the following statement. He wrote in the reign of Muḥammad Sháh (1131–1161 Ḥ.) and was old enough to recollect the excitement caused in Dihli by the news of 'Alamgír's death. He himself, like his father before him, was a clerk in the Central Revenue Office, and a man likely to have, if any one had, exact knowledge on the point under discussion. His words are: "Although the first auspicious "enthronement took place on the 1st of the month Ẓú,l-ḳa'dh, 1068 Ḥ. "(30th July 1658), yet as the blessed rays of the brilliant light of "victory and success were displayed to the world in the month of Ram-"ẓán, the first day of that blessed month was assumed as the commence-"ment of these years full of miracles, and the exalted order issued that "in all offices, and calendars, and patents of appointment, and royal "rescripts, this rule should be adopted, in opposition to that of previous "sovereigns, rulers in Islám who, following the practice of Jamshíd, "Kakhir (Kasrú?) and others, held Farwardín to be the most excellent "month, and appointed it for the commencement of their reigns. This "rule was now abrogated, and the years of the fortunate reign were ap-"pointed to be reckoned by lunar months from the month of Ramẓán" [B.M. Addl. MSS. No. 24027, fol. 490b.] For this work and its author, see Elliot, VIII. 70, 71. Here he is evidently writing with Muḥammad Káẓim's or Muḥammad Sáḳí's work before him. The 1st Ramẓán, 1068 Ḥ., is equivalent to the 2nd June 1658.

We can now account for Muḥammad Sáḳí's statement (*Ma,áṣir-i-'Alamgírí*, 523), that 'Alamgír reigned 50 years, 2 months, 27 days.

I think that these authorities prove, without any room for doubt, that 'Alamgír counted his reign from the 1st Ramẓán, 1068 Ḥ, and after that date had been once fixed upon, no alteration was ever made. This is the result arrived at by considering the historical evidence alone. Do the extant coins of the reign conflict in any way with its historians? Now, there may be some reason for thinking that occasionally some numismatists (in this branch of their subject, at any rate), concentrate their attention too much on the coins themselves, to the neglect of contemporary historians from whom they might derive much assistance. For we are dealing here with a modern period, on the history of which there is an abundance of material available. Be that as it may, let us, too, confine our attention for the moment to the coins themselves. The coins of 'Alamgír, which are already to be found in the British Museum collection, constrain us, unless some of those coins are a posthumous issue, to throw back the initial year of the reign from 1069 Ḥ. to 1068 Ḥ.

Dated coins for the 51st year of a reign necessarily imply fifty completed years of that reign. Now, the silver coins Nos. 843–846 in the British Museum, are dated in 'Alamgír's 51st year. On the other hand, there is no dispute about the date of his death; it took place in 1118 Ḥ. Even if we allow up to the last day of that year, where can you find room, within that limit, for fifty completed years, unless you throw back the first day of the reign into some part of the year 1068 Ḥ.?

As I am led to believe, the argument for 1069 Ḥ. is founded on the rule that the enthronement, the reading of the *k͟huṭbah*, and the issue of coin, taken together, form of themselves the official act of accession. In cases where there is no proof to the contrary, I see no reason to quarrel with this assumption. Indeed, for some purposes, it might even be the only right date to consider. For instance, if I wished to fix the date from which 'Alamgír became undisputed sovereign, I should, with Mr. S. Lane Poole, elect for the year 1069 Ḥ. On the other hand, if a sovereign, in defiance of facts, chooses to fix an assumed or fictitious date for his accession, it is useless for us to say that he had no just right to do so. The all-important things for us are: 1st, to know that he ordered the adoption of such official date; and 2ndly, to ascertain, on the best evidence, what that date was. Of all the acts of sovereignty hardly one can be held more formal and official than the issue of coinage: and can we suppose that on the face of that coinage any date would appear, other than one fixed according to official reckoning? Over and over again, we find that the official reckoning and the date of accession, according to actual facts, are altogether discrepant. It is so in the case of 'Alamgír.

Bahádur Sháh. His father died at Aḥmadnagar, in the Dakhin, on the 28th Ẕú,l-Ḳa'dh, 1118 Ḥ. (2nd March, 1707). He heard of the event at Jamrúd, west of Pesháwar, on the 18th Ẕú,l-Ḥajj, [Kámwar K͟hán, *Táríḵh-i-Saláṭín-i-Chag͟htaiyah*, my copy, and Jag Jívan Dás, Gujaráti *Muntak͟hab-ut-Tawáríḵh*, written in 1120 Ḥ., [B.M. Addl. MSS. No. 26,253]. He was enthroned at Pul-i-Sháh Daulah Darvesh, about 15 miles west of Láhor, in Muḥarram 1119 Ḥ. Muḥammad Ḳásim, Láhori, '*Ibratnámah*, India Office Library, No. 252, and Jag Jívan Dás, already cited). Muḥammad 'Ali's *Burhán-ul-Fatúḥ* (B.M. Oriental MSS. No. 1884, fol. 162b.), fixes this enthronement on the 24th Muḥarram (26th April 707). He gained a complete victory over his brother 'Aẓam Sháh at Jájau, near Ágrah, on the 18th Rabi' I. 1119 Ḥ. (18th June 707)—(Dánishmand K͟hán, 'Ali *tak͟hallus* "*Jangnámah*," and K͟háfi K͟hán, II, 590). But on the 1st Shawwál 1119 Ḥ. (25th Dec. 1707), he issued an order that his reign should commence from the 18th Ẕú,l-Ḥajj. 1118 Ḥ. (22nd March 1707), the day that he heard of his father's death

[Dánishmand K͟hán, 'Alí, in his *Bahádur Sháh-námah*, entry of the said date and K͟háfí K͟hán, Text II, 607]. The passage in Dánishmand K͟hán reads as follows: "The 1st Shawwál, 1st year, Ghásí Rám, principal "clerk to the Chief Intelligencer, or *Wáḳiahnigár-i-kul*, made a report "asking for orders fixing the date from which the reign was to be "reckoned, that the same might be entered in the official proceedings. "Orders issued to take the 18th Ȥú,l-Ḥajj, and a report was called for "as to the New Year's day by the solar year. In reply this was stated "to be the 1st Farwardín and a Sunday. That day was accordingly "fixed and ordered to be recorded." [B.M. Oriental MSS. No. 24, fol. 95a.]. This may mean that the 1st Farwardín or the 18th Ȥú,l-Ḥajj was adopted. If the former, that would be the 10th or 11th March, equal to the 5th or 6th Ȥú,l-Ḥajj, 1118 Ḥ.

Jahándár Sháh. As he did not survive to begin a second year's reign, there does not appear to have been any order passed fixing an official date for his accession. He was enthroned in the plain east of Láhor on the 21st Ṣafar, 1124 Ḥ. (29th March 1712) [Núr-ud-dín, Multání, *Jahándár-námah* and Kámwar K͟hán, *Táríkh-i-S.-i-Ch.*], his father, Bahádur Sháh, having died on the 20th Muḥarram, 1124 Ḥ. (27th February 1712) [Kámwar K͟hán].

Farruk͟hsíyar. He heard of his father 'Aẕím-ush-shán's death near Láhor, when he was himself at Paṭnah-'Aẕímábád. He was enthroned there, in the *bág͟h* known as Afẕal K͟hán's, on the 29th Ṣafar, 1124 Ḥ. (6th April 1712) [Muḥammad Aḥsan, Ijád, *Farruk͟h-siyar-námah*, B.M. Oriental, No. 25, fol. 40a.] On the 9th Jumádi II, 1125 Ḥ. (2nd July 1713), he ordered that Jahándár Sháh's reign should be struck out of the records and treated as non-existent. He directed at the same time that his own reign should be dated from his enthronement at Patna, namely the 29th Ṣafar, 1124 Ḥ. [Kámwar K͟hán, *Táríkh-i-S.-i-Ch.:* entry of 9th Jumádi II, 1125, and K͟hushál Chand, B.M. Or. 3288, fol. 397a.] K͟háfí K͟hán, II, 737, has the wrong year, 1123 instead of 1124. He and K͟hushál Chand have the 1st Rabí' I, which is, of course, the next day to the 29th Ṣafar, so that there is no practical difference, on this point, between them and Kámwar K͟hán.

Rafí'-ud Darját. As he reigned for a few months only, no order was passed fixing officially the first day of his reign. He was enthroned in the palace at Dihli on the 9th Rabí' II, 1131 Ḥ. (28th February 1719) [Kámwar K͟hán, *Táríkh-i-S.-i-Ch:* and K͟háfi K͟hán, II, 816]; he was deposed and sent back into the palace on the 17th Rajab, 1131 Ḥ. (4th June 1719), and he died there on the 24th of the same month (11th June 1719) [Kámwar K͟hán, and K͟háfí K͟hán II, 830].

Rafí'-ud-daulah. This prince was the next elder brother of the preceding. At his brother Rafí'-ud-darját's earnest request he was selected as successor, and raised to the throne some days before his predecessor's death. The enthronement took place in the palace at Dihlí, on the 19th Rajab, 1131 Ḥ. (6th June 1719) [Kámwar K͟hán, but K͟háfí K͟hán, II, 831, has the 20th]. The prince died in camp near Ágrah, on the 4th or 5th Ẕú,l-Ḳa'dh, 1131 Ḥ. (17th or 18th Septr. 1719) [Kámwar K͟hán]. In his case also no question can arise, as he did not survive to enter a second year.

NEKÚSIYAR. This pretender, son of Prince Muḥammad Akbar, the fourth son of 'Álamgír, was proclaimed by the mutinous garrison from the battlements of Ágrah Fort, on the 29th Jumádí II, 1131 Ḥ. (18th May 1719) [see K͟háfí K͟hán, II, 825, Kámwar K͟hán's *Tárík͟h-i-S.-i-Ch.*, and Muḥammad Ḳásim's *'Ibratnámah*]. Nekúsiyar surrendered to Sayyad Ḥusain 'Alí K͟hán between the 22nd and the 27th Ramẓán, 1131, Ḥ. (July 7–12, 1719) [Kámwar K͟hán].

MUḤAMMAD SHÁH. This prince was brought from Dihli and reached the imperial camp on the 11th Ẕú,l-Ḳa'dh, 1131 Ḥ. (24th Septr. 1719) [Kámwar K͟hán and K͟háfí K͟hán, II, 840]. He was enthroned on the 15th Ẕú,l-Ḳa'dh, 1131 Ḥ. (28th Septr. 1719), at a village called Bidyápur, between Ágrah and Fatḥpur Sikri, three *kos* and a fraction from the latter place [Kámwar K͟hán and K͟háfí K͟hán, II, 840]. It was directed that his reign should be reckoned from the deposition of Farruk͟hsiyar [Muḥammad 'Alí K͟hán, *Tárík͟h-i-Muẓaffarí* and K͟háfí K͟hán II, 841]. Accordingly it is counted usually from the 9th Rabí' II, 1131 Ḥ. (28th Feb. 1719). But the contemporary authority, Kámwar K͟hán, gives the first of that month, namely the 1st Rabí' II, 1131 Ḥ. (20th Feb. 1719), as the exact reckoning.

I may note that the dates of the Christian era, given in this paper, are all calculated according to the Gregorian or New Style. I have used the "Practical Tables...." of Johannes von Gumpach, London, James Madden, 1856.

Although not strictly within the scope of this paper, I append some remarks on Moghul mint-towns, as likely to be of use to any one interested in my more immediate subject, and I am not likely to find any other early opportunity of placing the results on record. These notes are in continuation of those printed in the Society's *Proceedings* for January 1893.

'ÁLAMGÍRPUR. Places with this name seem very hard to find; I therefore note those I know of. But in the absence of special reasons for doing so, it would be hazardous to suggest that either is the mint-town for coin No. 772 of the British Museum Catalogue. I find by an entry in Kámwar K͟hán's *Táríkh-i-Salátín-i-Chaghtaiyah*, that on the 22nd Ramẓán, 1122 Ḥ. (13th Nov. 1710), Bahádur Sháh was encamped at ʻAẓímábád Taláori, "alias *ʻAlamgírpur*," being the halting place between Karnál and Thánesar. Also, if I recollect rightly, there is a village ʻAlamgírpur close to the east or left bank of the Jamuná, in the Sahâranpur district. ʻAlamgír was in that part of the country, on at least one occasion, on a hunting expedition to Bádshàhi Mahal and parganah Faizábád (Sahâranpur District).

MU'AẒẒAMÁBÁD. I have little or no doubt that this mint town should be identified with Gorakhpur, Ṣúbah Audh. When I was serving in that district I recollect seeing the name Mu'aẓẓamábád, Gorakhpur, used in the *Mawázinah* and *Ḳanúngoí* papers of the end of the last century, which twenty years ago were still in existence. Only a few days ago, I was reading the autobiography of some un-named dependant on Faẓl ʻAlí K͟hán, once *ʻAmil* of G͟házípur. For a few years Faẓl ʻAlí K͟han, was *Faujdár* of Gorakhpur (F. Curwen's translation of K͟hair-ud-dín Muḥammad, Allahábádí's, *Tuḥfah-i-Tázah*, p. 19). When speaking of this appointment, this anonymous writer calls the place "the *Sirkár* of Sarwár, otherwise Mu'aẓẓamábád-Gorakhpur."

NAṢRATÁBÁD. In the *Ma,áṣir-i ʻAlamgírí* (p. 304, year 1098 Ḥ.) ʻAlamgír, after taking Ḥaidarábád, advanced against Sakkhar, a place between Bíjápur and Ḥaidarábád. It was then ruled by Nand (or Parya, or Paid) Náik, a man of the low Dheṛh caste. After it had been taken, the country (*úlkah*) of Sakkhar was by the Emperor's orders renamed Naṣratábád [*ibidem*, p. 307]. For other notices of it, under its new name, see pp. 344, 345, 360, 364, 384, 410, 416, and 513 of the same volume. It is also mentioned as Naṣratábád-Sagar in the *Ma,áṣir-ul-Umrá*, II, 291. Thornton, *Gazetteer*, 936, states that "Suggur" is a town in the Nizam's territory, Lat. 16° 36′, Long. 76° 51′, 124 miles S.-W. by W. from Ḥaidarábád. On the map of India in Johnston's Royal Atlas it appears as Sagar.

SHÁHÁBAD ḲANAUJ. In the British Museum Catalogue, p. 212, there is a coin No. 1019, which the author assigns (p. lviii) to Sháhábád in Audh, disregarding the second word, which he reads *Fatúḥ*. I think there can be little doubt that this word should be read *Ḳanauj*, قنوج. The name is usually spelt by Muhammadans with ق, see, for instance, K͟háfí K͟hán, Text I, pp. 63, 73, 109; also throughout the *ʻAín i Akbarí*, Blochmann's translation, I, 32, etc. (entered in his Index under Q). I was four years in the Farruk͟hábád district (in which Ḳanauj is included), and my recollection is that the old official name of the place was Shahábád Ḳanauj. It is so styled in Dowson's Elliot, VIII. 46. I thus propose Ḳanauj, Ṣúbah Akbarábád, instead of Sháhábád, Sirkár K͟hairábád, Ṣúbah Audh.

Ẕafarábád. Since I wrote my former remarks I have found a direct mention of the occasion when Bídar was re-named Ẕafarábád. It is also frequently called Muḥammábád Bídar. The passage I refer to is in K͟háfí K͟hán, II. p. 3. He tells us that in 1066 Ḥ., the thirtieth year of Sháhjahán, Prince Aurangzíb was appointed to make a campaign against Bijápur, just after he had "by notable exertions, acquired the fort of "Bídar and the Ṣúbah of Aḥmadábád, and the fort of Kaliyáni, and "had re-named them the Ṣúbah of Ẕafarábád."

Note on the preceding Paper.—By Dr. A. F. Rudolf Hoernle.

I fully agree with Mr. Irvine that Aurangzíb's reign should be dated from 1068–1118 A. Ḥ. or 1658–1707 A. D. I had never made any special enquiries on the exact official date of his accession, and the initial date 1869, given in my coin-reports in the *Proceedings* was simply quoted as that usually assigned. That it is wrong,—if the reign is to be counted from the *officially* fixed date, and not from the date of the *actual* accession,—Mr. Irvine has amply established; and I agree with him, that it is more reasonable to accept the official date as fixed by an emperor himself.

I should, however, put "the two all-important things for us" rather in this form:—1. To know what date was officially fixed by an emperor; 2, to ascertain whether the date, officially fixed, was actually adhered to in dating coins and documents of his reign.

Now with regard to Aurangzíb, nearly all his coins do adhere to the officially fixed date. There are, however, a few exceptions:—

1. There is the coin, No. 845 of the British Museum, dated in 1119 Ḥijrah, and 51 regnal. It is the only one with this peculiar date that I remember to have come across. As Aurangzíb died on the 2nd March 1707, and the Ḥijrah year 1119 only commenced on the 3rd or 4th April 1707 (or the 1st Muḥarram 1119), it is clear that either the date 1119 is wrong, or that the coin is posthumous. That the latter may be the true explanation, appears from the following facts:—Aurangzíb's successor was Bahádur Sháh. He heard of his father's death only three weeks afterwards, on the 22nd March 1707, and his *actual* enthronement took place only on the 26th April 1707, that is, on the 24th Muḥarram 1119. It was not till the 25th December 1707, that the official date of his accession was fixed to be the 22nd March 1707. It is, therefore, quite possible that coins struck in the time intermediate between the 2nd March 1707, the date of Aurangzíb's death, and the 26th April 1707, the date of Bahádur Sháh's *actual* accession, were still issued in Aurangzíb's name. It would thus occur that a coin,

struck between the 1st and 24th Muḥarram of 1119 Ḥijrah, would be issued as one of Aurangzib's, dated in his 51st year and in 1119 Ḥijrah. This practice would cease as soon as the actual enthronement had taken place, and notice of the fact had been proclaimed in all mint-towns.

It would be interesting to know what the actual practice was with regard to coining during a period of temporary vacancy, whether actual or official, of the throne. When an emperor died, did the coining in his name cease in a mint-town, as soon as the news of his death reached that town; or was coining in his name continued, till news arrived of the *actual* accession of his successor; or was it continued till information was received of the *officially* fixed date of accession? Thus to take Aurangzib's case as an example, did coining in his name cease from the 2nd March 1707 (the date of his death) in Aḥmadnagar (the place of his death), and similarly in other mint-towns as soon as the news of his death was received? Or did it cease from the 26th April 1707, the date of Bahádur Sháh's actual enthronement, in Láhor, and in other places as soon as information of the enthronement was received?

2. There is no real difficulty in the case of coins like the preceding. It is different with such coins of Aurangzíb as are dated in his first regnal year, and in 1070 Ḥijrah. No. 728 in the British Museum is such a coin of the Patna mint. It is figured on Plate XIX of the B. M. Catalogue. The regnal year is expressed verbally *aḥad.* In my own collection, I have two such coins, of the mints Multán and Ẕafarábád respectively. The latter is from a treasure trove found in Champaran in 1892.

Now, reckoning by the *official* date, Aurangzib's first year runs from the 1st Ramaẓán 1068 to the last Sha'bán 1069, and the second year, from the 1st Ramaẓán 1069 to the last Sha'bán 1070. Accordingly the coins of his first year might be dated in 1068 or 1069, those of his second year, in 1069 or 1070. But no coin could be dated both in his first year and in 1070. That dating is only admissible, if the accession of Aurangzib is placed at some point of time in 1069.

These coins require some explanation. They certainly do not agree with the official reckoning. They are undoubtedly exceptional specimens, but they are not exceptionally rare, nor are they a vagary of some obscure or outlying mint-town. They were issued from places so well-known and so far apart, as Paṭná and Multán. It does seem that in the case of these coins, at least, the accession of Aurangzib was dated from the 24th Ramaẓán 1069 (15th June 1659), the day on which the second enthronement took place with full ceremonials. But if so, how is the non-observance of the officially fixed date to be explained?

Is it possible, that there was an interval between the receipt of the news of the second enthronement and the receipt of the information of the officially fixed date, and that those exceptional coins were struck during that interval? The interval could not have been of long duration, and this explains the paucity of those peculiar coins. One can easily imagine that the news of the ceremonies of the second enthronement travelled faster, than the communication of the matters officially settled at that time. Still the interval must have been, at least, three months; for the Ḥijrah year 1070 commenced on the 18th September 1659; and no coin, with the dates 1070 and *aḥad*, could have been struck before the first month, or Muḥarram, of 1070 Ḥijrah (18th September to 17th October 1659). On the theory, here suggested, it is quite possible that also some of the extant coins, dated 1069 Ḥijrah and *aḥad* (or 1st year) regnal, were struck by the same wrong reckoning, that is, after the termination of the *officially* fixed first year. This would be the case with all those coins which were struck after the second enthronement and during the three last months of the Ḥijrah year 1069. When once the accession was *officially* antedated on the 1st Ramaẓán 1068, the three months after the Ramaẓán of 1069 (and in fact, that Ramaẓán itself) fell outside the first year of the reign. As the months of coining are not mentioned on Aurangzib's coins (as they are on some classes of coins of his predecessors), it is now impossible to determine, whether any of the coins, with 1069 *aḥad*, are really wrongly dated, if regard is had to the *official* reckoning.

For easy reference I here re-print, from the B. M. Catalogue (p. 392), the portion of the comparative table of the years A. Ḥ. and A. D. which is in question. The month, day, and day of the week of the Christian year are placed under each Muhammadan month, and correspond to the first of that month. The week-days are lettered from A (for Sunday) to G (Saturday). The months are indicated by Roman numerals. Thus the first entry 9 X C shows that the month of Muḥarram 1068 began on Tuesday the 9th October 1657.

A. Ḥ.	A. D.	Muḥarram.	Safar.	Rabí' I.	Rabí' II.	Jumádi I.	Jumádi II.
1068	1657	9 X C	8 XI E	7 XII F	58, 6 I A	4 II B	6 III D
1069	1658	29 IX A	29 X C	27 XI D	27 XII F	59, 25 I G	24 II B
1070	1659	18 IX E	18 X G	16 XI A	16 XII C	60, 14 I D	13 II F

A. H.	A. D.	Rajab.	Sha'bán.	Ramaẓán.	Shawwál.	Zú-l-Qa'dah.	Zú-l-Ḥijrah.
1068	1657	4 IV E	4 V G	2 VI A	2 VII C	31 VII D	30 VIII F
1069	1658	25 III C	24 IV E	23 V F	22 VI A	21 VII B	20 VIII D
1070	1659	13 III G	12 IV B	11 V C	10 VI A	9 VII F	8 VIII A

The Koch Kings of Kámarúpa.—By E. A. Gait, Esq., I. C. S.

Introduction.

Perhaps the most interesting epoch in Assam history is that in which the Koch dynasty rose to power, and after defeating the petty chiefs amongst whom the country had been split up after the fall of the Pála rulers, succeeded in consolidating their rule throughout the ancient Kámarúpa, and in reviving for a time the pristine glories of that once famous kingdom.

Several accounts of the Koch dynasty are already available,* but by far the most detailed narrative of the early founders of this kingdom with which I am acquainted, is that contained in a manuscript history [*Vaṁśávali* or *Purushanáma* (Sanskrit)] in the possession of Raja Lakshmí Náráyaṇa Kuar, the leading representative of the Darrang branch of the Koch family.

This history is supposed to have been written, about 1806 A. D., by Súrya Hari Gaṇaka, under the orders of Raja Samudra Náráyaṇa.† It is inscribed on oblong strips of *Sachi* bark, and each page is illustrated. The story ends suddenly with the death of Paríkshit, and as there is nothing to show that the work was considered finished, it is conjectured that the author died before he had completed it.

As no account of this *Vamśávali* has hitherto appeared in print, I propose to furnish an abstract of it now, and to take the opportunity to give a sketch of what is known of the country before the Koch kings rose to power, and to examine one or two questions connected with this dynasty regarding which existing accounts differ, in the light of the information afforded by this history and also of inscriptions on temples and other sources.‡

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* Cf. *A'sámburanjis* by Biśveśwar and Rái Guṇábhirám Baṛua, Robinson's Descriptive Account of Assam, Dr. Hunter's Statistical accounts of Koch Bihár and Raṅgpur, and the accounts by Buchanan Hamilton, Babu Rám Chandra Ghosh and other authorities cited in Dr. Hunter's works.

† Súrya Hari Gaṇaka is reputed to have been the greatest Sanskrit scholar of his time in Assam. He was the author of numerous Sanskrit and Assamese works, and his descendant, Manbhál Maṇḍal, holds a deed of gift dated 1720 S'ak (1804 A. D.) by which the A'hom King made a grant of land to Súrya Hari in recognition of his learning and piety.

‡ Including the *Vaṁśávali* of Rájá Prasiddha Náráyaṇa Kuar, a manuscript copy of the *Yoginí Tantra* in the possession of a Bráhmaṇ of Haulí Mohanpur, in which the prophecies of the gods have from time to time been brought up to date, and lastly a few inscription in temples, and the references made to the Koch

Kamarupa before the Koch kings.

The early history of Kámarúpa is wrapped in mystery, and our knowledge of it is drawn from dubious and fragmentary references in the *Mahábhárata*, and in the *Puráṇas* and *Tantras*, chief amongst which may be mentioned the *Yoginí Tantra* and the *Bhágavata* and *Káliká Puráṇas*.

Extent of Kamarupa.

The boundaries of the country varied greatly from time to time. In the *Yoginí Tantra* it is said that Kámarúpa comprised the country between the Karatoyá and the Dikrai, so that it included not only the whole of what is now known as the Brahmaputra Valley, but also Rangpur and the State of Koch Bihár. It was subdivided into four portions, *viz*: Kámapíṭha from the Karatoyá to the Sankosh, Ratnapíṭha from the Sankosh to the Rupahi, Suvarṇapíṭhá from the Rupahi to the Bharali, and Saumarpiṭha from the Bharali to the Dikkara-básiní or Dikrai. It is described as bounded on the North by Kuñjagiri, on the West by the Karatoyá, on the East by the Girikañjaka, and on the South by the junction of the Brahmaputra and Lakshma rivers. It is added that Kámarúpa is three cornered and is 100 yojanas in breadth and 300 yojanas in length.* According to the *Káliká Puráṇa*, Kámákhyá and Prágjyotishapura were situated in the centre of Kámarúpa, and the *Vishṇu Puráṇa* adds that the country extended around it for 100 yojanas in all directions.† In the *Mahábhárata*, Bhagadatta's Empire of Prágjyotisha or Kámarúpa is spoken of as extending to the seacoast,‡ and the copper plate of Vanamála, which will be referred to further on, says that the rule of that monarch also extended to the sea.§

Hiuen Tsiang places the circumference of the country when he visited it, at 10,000 li, from which General Cunningham infers that it must, at that time, have comprised the whole of the Brahmaputra Valley as well as Koch Bihár and Bhotán.||

The name of the country is mythologically explained as follows:—

Origin of name "Kamarupa."

When Satí died of grief at the reproaches of her husband S'iva, the latter, overcome by remorse, wandered about the world carrying her dead body on his head. In order to put a stop to his penance Vishṇu followed him and lopped

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Kings by Muṣalmán historians, which have been made accessible by Blochmann in the J. A. S. B. for 1872.

* Edition published in Calcutta at the Bangobashi press in 1294 Sal, pp. 76, 77.

† Káliká Puráṇa, page 91, of Edition published at the Bangobashi press; and Vishṇu Puráṇa, page 81 of Edition published at the same press.

‡ Sabhá Parva, XXVI, XXVII. The references found elsewhere to the different parts of the Mahábhárata are to the translation of Pratáp Chandra Roy.

§ J. A. S. B. IX, (Part II) 773.

|| Ancient geography of India, Volume I, Buddhist period, p 500.

away the body piece-meal with his discus. The body fell to earth in 51 different pieces, and wherever each piece fell, the ground was held to be sacred. Her organs of generation fell on Niláchala hill near Gauháṭí, and the deity of that place was thenceforth known as Kámákhyá, the goddess of sexual desire. As S'iva still continued to do penance, the other gods became afraid that he would thereby acquire universal power, and accordingly despatched Kámadeva, the Indian Cupid, to make him fall in love again, and thereby break his penance. Kámadeva succeeded in his Mission, but so enraged was S'iva at the result, that he burnt him to ashes by a fiery glance from the eye in the centre of his forehead. Kámadeva eventually recovered his original form, and the place in which this took place was ever afterwards known as Kámarúpa.

Mahiranga Danava.

The earliest recorded king of Kámarúpa, of whom however, very little is known, was named Mahíraṅga Dánava.[*] He was succeeded by his son Háṭaka Asura, after whom came S'ambara Asura and then Ratna Asura.[†]

Ghataka Kirata.

After this, there was a chief named Ghaṭaka, the ruler of the Kirátas, who are said to have been a powerful race, much addicted to eating flesh and drinking strong drinks.

Naraka Asura.

Ghaṭaka was defeated and slain by Naraka, who was born of the earth by Vishṇu, and had been deputed by him to exterminate the Kirátas. Having succeeded in doing this,[‡] he made Prágjyotishapura (the modern Gauháṭí) his capital,[§] and settled numerous Bráhmans at Kámákhyá. His rule extended from the Karatoyá on the West, to the Dikráṅg on the East. It is said that he married Máyá, the daughter of the king of Vidarbha or Kuṇḍina. Naraka was greatly favoured by Vishṇu who placed him in charge of Kámákhyá, and told him that so long as that goddess was pleased with him he would do well, but that if he angered her, he would suffer, and that he himself would then desert him. It is said that Naraka carried off 10,000 girls as wives, and that he became so proud that he asked Kámákhyá to marry him. To this the goddess assented on condition that he erected a temple to her on Nilàchala and also constructed a tank and a road to the temple in a single night. Naraka accepted the terms and had almost accomplished his task, when the goddess caused a cock to crow before dawn, and saying that that was a proof that day had come, evaded her promise and refused to marry him. Overcome with rage, Naraka slew the cock, and the place where he did this is still known as Kukuṭa-Káṭá (the place where the cock was killed). But Naraka's crowning misfortune was his refusal to permit Vaśishṭha Muni to go to worship at Kámákhyá, in consequence of which the Muni cursed Naraka and Kámákhyá, saying that thence forward no one who worshipped at Kámákhyá's shrine should see the fulfilment of his desire. By the aid of S'iva, the duration of this curse was limited to three hundred years, but Naraka had now completely alienated both Kámákhyá and Vishṇu and was eventually slain by the latter in the incarnation of Kṛishṇa. Kṛishṇa's invasion of Prágjyotishapura is described in the *Bhágavata* and *Vishṇu Puráṇas*, in the latter of which it is stated that his attack on Naraka was instigated by Indra.* The capital was defended by sharp *páñjís* and by numerous outworks erected by the Asura Muru, but Kṛishṇa cut his way through with his discus and slew Muru and his sons. He then entered the city and engaged in a terrible combat with Naraka, and after killing thousands of daityas, he clove Naraka in twain with his discus. He recovered the golden earrings of Aditi and other property seized by him, and sent the 10,000 girls imprisoned in his harem together with his 6,000 elephants and his horses to Dváraka.

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[*] Notices of Mahíraṅga and his successors will be found in the Káliká Puráṇa Chaps. 36–42, and on page 81 of the *Yoginí Tantra*. In the Raghuvaṁśa, it is related that Raghu crossed the Brahmaputra with a view to attacking the king of Prágjyotisha or Kámarúpa. The latter is said to have submitted without venturing to give battle, and to have paid a tribute of war elephants. The name of the king is not mentioned.

[†] The names Dánava and Asura, indicate that these kings were of aboriginal origin. According to the *Vaṁśávalí* of Prasiddha Náráyan Kuar, Sambar, who is mentioned in the text as the grandson of Mahíraṅga, was the founder of the dynasty. He is there spoken of as the son of Brahmá, and is said to have had his capital at Raṅgamáṭí.

[‡] Apparently he only subdued them. In the *Udyoga Parvan*, his son Bhagadatta is referred to as bringing Kirátas to the aid of Duryodhana. (XVIII, 15-16.)

[§] There is a hill near Gauháṭí which is still known as the hill of Naraka Asur.

Bhagadatta.

Naraka left two sons, Bhagadatta and Vajradatta, of whom the former was appointed by Kṛishṇa to succeed him as king of Prágjyotisha. Bhagadatta is frequently referred to in the *Mahábhárata*. In the *Sabhá Parvan*, it is related that he was defeated by Arjuna after a battle which lasted for eight days.† Later on, when the forces of the Kauravas and Páṇḍavas were being mustered for the last struggle,

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* Bhágavata Puráṇa (Edition published at the *Bangobashi* press) X, 59, and Vishṇu Puráṇa, pp. 81—83 (V, 29)

† Sabhá Parvan, secs. XXVI and XXVII. His troops are described as a host of Kirátas and Chinas, and numerous other warriors that dwelt on the seacoast.

Bhagadatta went to the assistance of Duryodhana with an *Akshauhiṇi* of troops consisting of Chinas and Kirátas.[*] At the final battle of Kurukshetra, he performed prodigies of valour, and no less than four sections of the *Droṇa Parvan* are devoted to a narrative of his heroic deeds, from the time when he rescued Duryodhana from the onslaughts of Bhima to his fight with Arjuna, in which he was at last defeated and slain. The issue of this last combat is ascribed to the magic intervention of Kṛishṇa, who rendered harmless the invincible weapon which he had previously given to Bhagadatta's father Naraka.[†]

Bhagadatta's successors.

Bhagadatta was succeeded by others of his line, one of whom, Pralambha, is described as having been an unusually powerful prince. By his wife Jívadá, he had a son named Hajara, and the latter, by his wife Tárá, who was an incarnation of Lakshmí, had in his turn a son named Vanamála. A copper plate containing a grant of land by the latter to a Bráhmaṇ which was found near Tezpur in 1840 A. D., is the authority for the account of Bhagadatta's successors here given.[‡]

It has been assumed that Vanamála was of the Pála dynasty, but his asserted descent from Naraka makes this impossible; this assumed ancestry, and the fact that he bore the Kshattriya title Varman or Barman, renders it much more likely that he was a converted aboriginal potentate of the same class as the Khyen and Koch kings.

The so-called Rájás of Ráni, in Kámrúp, claim to be descended from the lineage of Bhagadatta.

Rape of Rukmini.

Kṛishṇa frequently appears in Assam Mythology. We have already seen how he slew Naraka and set up his son Bhagadatta in his stead. He is also said to have carried off his bride Rukmiṇi from her father Bhíshmaka, the king of Kuṇḍilya[§] or the country around Sadiyá, between the Dikráng and Dibong rivers. The name of this monarch is still preserved in upper Assam, and a ruined fort, some sixteen miles north of Sadiyá, is attributed to his reign.[||] The name of the kingdom survives in the Kuṇḍil river.

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[*] Udyoga Parvan, sec. XVIII.

[†] Droṇa Parvan, secs. XXVI—XXX.

[‡] J. A. S. B. IX, p. 766. The plate bears a date in an unknown era—" Samvat 19 ". Presumably this refers to the date of the king's succession.

[§] According to ordinary Pauráṇik accounts, Bhíshmaka was king of Kuṇḍina or Vidarbha, the modern Berar, in Central India.–Ed.

[||] These ruins were described by Colonel Hannay in the J. A. S B. for 1848, p. 459. It is not unlikely that further research amongst this and other ruins in the same direction, would add considerably to our knowledge of ancient Assam history.

And of Usha.

Kṛishṇa's grandson, Aniruddha, carried off Ushá, the daughter of Báṇa Rájá, king of S'oṇitapura, the city of blood, now known by the Assamese equivalent, Tezpur—in consequence of which he was caught by that monarch and imprisoned. The subsequent invasion of Báṇa Rájá's kingdom by Kṛishṇa and the rescue of Aniruddha is described in the *Bhágavatá Puráṇa* and elsewhere. From the *Kálika Puráṇa* it appears that Rájá Báṇa was the contemporary and friend of Naraka.[*]

Conclusion to be drawn from these legends.

From these stories, all that we can gather with certainty is that the Brahmaputra Valley was known to the Aryan invaders of India at a very early period, and that the process of converting the aboriginal tribes to Hinduism, which is going on before our eyes to-day, commenced long before the time of which we have any authentic record.

Kámarúpa appears to have been a famous place for pilgrimages and devotions, and the fame of Kámákhyá and the Brahmakuṇḍa had spread abroad at a very early date. In the *Tantras* it is said: "Elsewhere deities are scarce, but in Kámarúpa, they are found in every house."

Devesvara.

At the beginning of the S'akáditya era, a king named Deveśvara ruled somewhere in Kámarúpa, but the site of his capital is unknown. He was a S'údra by caste, and is said to have tried to prevent the spread of Buddhism and to propagate the worship of Kámákhyá, but without any very great success.

Nagasankara.

In the *Yoginí Tantra*, mention is made of Nágaśaṅkara or Nágákhya, who is said to have been born of the Karatoyá river, about 378 A. D., and to have founded a dynasty which ruled for four hundred years. His capital was above the Nágaśaṅkara temple at Pratápgaṛh, in Vishṇunátha (Bishnáth).

Hiuen Tsiang's account of Kamarupa.

Our earliest authentic knowledge of the country is derived from the writings of Hiuen Tsiang, the celebrated Chinese traveller and pilgrim. He visited Kámarúpa about 640 A. D., at which time a Hindú prince named

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[*] Vishṇu Puráṇa, Book V, Chaps. 32, 33, and Káliká Puráṇa, p. 94. The events described here form the subject of one of the earliest known epics in the Assamese language. It is known as *Kumára-haraṇa*, and is said to have been written by S'rí Chandra Bhárati.

It should be noted that Tezpur is not the only place which claims to be the site of Rájá Bána's capital. The remains of what is said to be the city of this king, are still pointed out at a place a few miles south of Dinájpur, which to this day is known as *Bán Rájár gaṛh*. (Anandarám Borua's Sanskrit Dictionary, p. 113.)

Kumára Bháskara Varman* was on the throne. He describes this ruler as a Bráhmaṇ, but by this it seems doubtful whether he meant anything more than that he was a Hindú and not a Buddhist. Barman is a well known Kshattriya title, and is one which is commonly adopted today by Kacháris, when they accept Hinduism and assume the sacred thread, on the fiction that they are concealed Kshattriyas. The method of conversion by fictions such as this is, doubtless, of very ancient date, and from the fact that this prince described himself as "Barman," it seems not unreasonable to presume that he was a Hindú convert from some aboriginal tribe. The presumption is strengthened by the fact that his subjects are described as being of small stature with dark yellow complexions, and by our knowledge that subsequent rulers, *e.g.*, the Khyen and Koch kings, were nothing more than Hinduised aborigines.

Hiuen Tsiang reports that the people adored and offered sacrifices to the Devas, and adds that although Buddhism was not forbidden, its votaries were scarce.

The soil is described as being deep and fertile, and the towns were surrounded by moats filled with water brought from rivers or banked up lakes.† The people were fierce in appearance, but upright and studious; their language differed somewhat from that spoken in Mid-India. In his time, as now, the country was famous for wild elephants, which were especially numerous in the south-east.‡

End of Naraka's dynasty.

After Hiuen Tsiang's account, we are again left with no authentic information regarding the country. It is said that Subáhu was born in the 19th generation beginning from Naraka, in the lineage of Bhagadatta. Subáhu became an ascetic and went to the Himálayas, and was succeeded by his son Suparuá who was killed by his ministers.

Jitari.

Then a Kshattriya Sannyási named Jitári, came from the west and founded a kingdom. He deserted Gauháṭi and built a capital further west. His contemporary Jalpeśvara had his capital where the S'ákta temple of Jalpeśvara (which he founded) now stands, in the Jalpaiguṛi District. Jitári was succeeded in turn by Subalí, Padma Náráyaṇa, Chandra Náráyaṇa,

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* *Si-yu-ki.* Beal's trans. II. p. 196.

† The Áhom capitals were in the same way encircled by moats, and the old Kachári capital at Dimápur was similarly protected on two sides, while the Dhansiri flowed along the third side.

‡ These animals appear always to have been plentiful, for we read in the Raghuvaṁśa that the king of Kámarúpa or Prágjyotisha gave many elephants as tribute to Raghu (IV—83), and in the Vishṇu Puráṇa (p. 81) it is stated that Kṛishṇa took 6,000 elephants from Naraka's capital, after he had defeated and slain that monarch.

Mahendra Náráyaṇa, Gajendra Náráyaṇa, Práṇa Náráyaṇa, Jaya Náráyaṇa, Kshobha Náráyaṇa, and Ráma Chandra.*

Arimatta.

The next king to be mentioned is Árimatta, who ruled the country on the south bank of the Brahmaputra from the neighbourhood of Gauháṭí, as far as Rahá in Nowgong. He is said to have been born of a princess of the house of Ráma Chandra,† who was raped by the Brahmaputra river. According to the *Vaṁśávali* of Prasiddha Náráyaṇa, Árimatta ruled at Baidargaṛh until 1160 S'ak. (A. D. 1238.)‡

Jangal Balahu.

His son Jaṅgál Báláhu was a mighty warrior, and and was engaged in constant feuds with the Kachárí and Jaintiá Rájás. The ruins of a fort said to have been built by him are still visible in Sahari Mauza, near Nowgong. He eventually made peace with the Kachárí Rájá, and married his daughter, but hostilities again broke out and he was defeated. He fled covered with wounds, and was drowned in the Kallang river.

Mimang, Mrigang, &c.

Four kings, named Mimaṅg, Gajaṅg, Sribaṅg and Mrigaṅg are mentioned by Guṇábhirám as having reigned for 200 years at Lohityapur in Kámarúpa, and as having been succeeded by Pheṅguá Rájá. In Prasiddha Náráyaṇa's *Vaṁśávali*, on the other hand, it is said that Naraṅg and Mrigaṅg were son and grandson of Árimatta, and that the latter being very pious made over his kingdom to Jaya Siṁha, a learned Bráhmaṇ of Darraṅg. But these accounts are so vague and uncertain that it seems to be useless to try to reconcile them or to construct a connected history from them.

Pala dynasty.

The Pála rulers still remain to be mentioned. There is no doubt that kings of this name at one time possessed great power in the country, but our information regarding them is very meagre. Rai Guṇábhirám Baruá in his

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* So Guṇábhirám and an old chronicle in the possession of a Bráhman, to which reference was made by General Jenkins in the J. A. S. B., IX., p. 766. Prasiddha Náráyaṇa's *Vaṁśávali* says that Ráma Chandra was 14th in descent from Jitári. Hannay (J. A. S. B. 1848, p. 464) identified Jitári with Dharma Pála, and says that his kingdom was in Central Assam and that the dynasty became extinct with Rája S'úkráṅka in 1478 A. D. He quotes no authority for these statements.

† So the *Vaṁśávali* of Prasiddha Náráyaṇa. Guṇábhirám says that the princess was of the Nágákhya line.

‡ The so-called Ḍimuriá Rájá in Kámrúp claims to be descended from Árimatta, and will not touch the Ari fish in consequence. Baidargaṛh is near Betná in Kámrúp. Guṇábhirám says that local tradition ascribes its erection to Pheṅguá Rájá. Traditions regarding Árimatta and his son are still current amongst the people, and their history is said to be narrated in an old *puthí* (now very rare) which I have not yet succeeded in obtaining.

Buranji gives a list of 17 Pála princes who reigned in Kámarúpa, *viz*: Jayanta Pála, Chakra Pála, Bhúmi Pála, Prema Pála, Paksha Pála, Daksha Pála, Chandra Pála, Náráyaṇa Pála, Madhu Pála, Indra Pála, Siṁha Pála, Kṛishṇa Pála, Su Pála, Gandha Pála, Mádhava Pála, S'yáma Pála, and Lakshmí Pála. He adds that these princes were Buddhists, and that Lakshmí Pála was followed by a king of the name of Subáhu who died childless and was succeeded by his Mantri Sumati.[*]

There is a tradition amongst a colony of Bráhmaṇs (called Basattariá, *i. e.* 72) resident at Suálkuchi in Kámarúpa, that they settled there in the reign of one Dharma Pála, and a copperplate in their possession records a grant of land made to them by that prince.

Another plate found recently at Benares and deciphered by Professor Venis, records the grant of two villages Badá and Mundará in the *Vishaya* of Badá in the *Bhukti* of Prágjyotisha in the *Maṇḍala* of Kámarúpa to a Bráhmaṇ named S'ridhara. The date of the grant has not been deciphered, but Professor Venis is of opinion that it was about 1142 A. D. The name of the prince making the grant is Kumára Pála, son of Ráma Pála and grandson of Vigraha Pála. The inscription says that Ráma Pála killed a certain Rájá Bhima. Kumára Pála is styled Lord of Gauḍa, and his General is said to have slain a rebellious vassal named Tiṁgya, or Tishya Deva in the East.[†] From the mention of Ráma Pála and Vigraha Pála and the title Gauḍeśvara assumed by Kumára Pála, this plate would seem to prove that the Rájá in question belonged to the Pála dynasty of Bengal, and the probability that this was so is strengthened by the fact that Deva Pála of that dynasty (who according to General Cunningham ruled from 850 to 885 A. D.) is said to have conquered Kámarúpa.[‡]

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[*] In an ancient-looking chronicle shown by a Bráhman to General Jenkins, Lakhi Pála, Subáhu and Sumati are mentioned first, then Jitári and his descendants, then the Pálas, and lastly Mimaṅg and his successors. It is almost impossible to give reasons for arranging these dynasties in one order rather than in another, particularly as it seems probable that they ruled in different parts of the country. It is supposed for instance that Mimaṅg, and his family reigned at Lohityapura in Kámarúpa, and that the capital of Jitári was outside modern Assam in the Jalpaiguṛí District.

The list of Pálas in this document differs slightly from that quoted in the text, and is given by General Jenkins as follows :—

Japandu Pála, Hari Pála, Dhamba Pála, Ráma Pála, Pakshya Pála, Chandra Pála, Náráyaṇa Pála, Mantrí Pála, Haina Pála, S'yáma Pála, Mactya Pála, Su Pála, Gandha Pála, Mádhava Pála, and Lakhiá Pála. The differences are however in many cases clearly due to misreadings of the original.

[†] Supplement to *Pandit* for February, 1893.

[‡] *Vide* copperplate found at Bhágalpur and translated by Rajendralála Mittra, J. A. S. B. 1878 page 407. The conquest of Kámarúpa is however uncer-

Mr. Westmacott in his "Traces of Buddhism in Dinájpur," was of opinion that the Bengal Pála dynasty at one time ruled the country north of the Padma, and Mr. Ferguson in his paper on Hiuen Tsiang says that "Pála kings were ruling east of the Karatoyá long after "Bengal had been subdued by the Senas, before whom indeed the Pálas "probably retreated by degrees to the north-east." The only conquest in Kámarúpa claimed by the Sena line. who succeeded the Pála dynasty in Bengal, is that of Vijaya Sena (1046–1066 A. D.) who is said in the inscription found at Rajshahye by Mr. Metcalfe, to have conquered the Kings of Gauḍa, Kámarúpa, and Kaliṅga.*

On the other hand it should be mentioned that the name Pála alone creates very little, if any, presumption regarding the lineage of the rulers bearing it. Many of the Bhuiyás were named Pála, and Dalton speaks of an Aryan dynasty of that name which ruled over Kuṇḍilya or the country around Sadiyá, and succumbed to a Chutiyá or Kachári invasion, probably about the same time that the Koches rose to power lower down the Valley.

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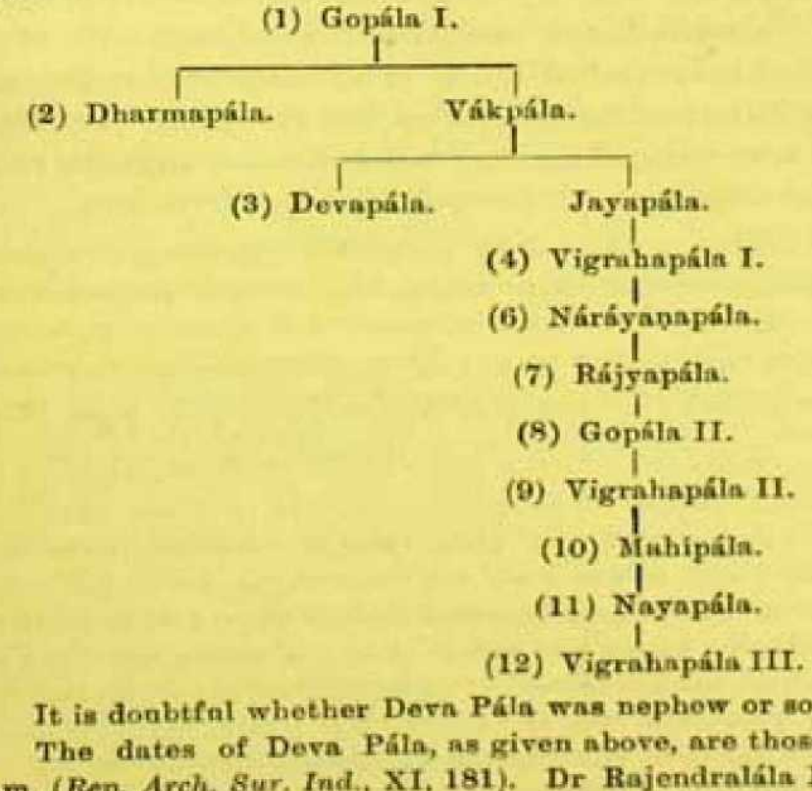
tain. According to Doctor Hultzsch the meaning of the verse is that Deva Pála supported the king of Kámarúpa against the king of Utkala (*Ind. Ant.* Vol XV, p. 308). Cf. Dr. Kielhorn's paper on the Dinájpur Inscription; J. A. S. B., Vol. LXI, Part I, pp. 77 and ff. The line of Pála Kings is now established to be as follows:—



It is doubtful whether Deva Pála was nephew or son of Dharma Pála.

The dates of Deva Pála, as given above, are those given by General Cunningham, (*Rep. Arch. Sur. Ind.*, XI, 181). Dr Rajendralála Mittra gives 895-915 A. D.

* J. A. S. B. 1878 page 401. It is however not very clear from his inscription whether the conqueror was the Sena prince or the ruler of Gauḍa.

In Glazier's Report on Rańgpur, Dharma Pála is mentioned as the founder of a dynasty. It is said that he was succeeded by his son Bhava Chandra, whose successor, Pála, was the last of the line. The remains of a fortified city which even now retains the name of Dharma Pála, are still to be seen in Rańgpur, and in the Baghdwár pargana of the same district are the ruins of Udayapura, the city of Udaya or Bhava Chandra.

The Khyen dynasty. Níladhvaja.

Leaving the Pála dynasty we come upon somewhat more certain ground. Tradition says that there was a certain Bráhmaṇ who had a most restless and troublesome cowherd. Going one day to chastise him, he found him asleep and a cobra shading him with its hood. He then noticed from the marks on his feet that he was destined to be a king. He informed him of the fact, released him from menial work and made him promise to make him his *mantrí* when he rose to power. In course of time, acting under the advice of the Brahman, the quondam cowherd deposed the last representative of the Pála race and ascended the throne, making the Bráhmaṇ his councillor. He assumed the name of Níladhvaja, and bringing many Bráhmaṇs from Mithilá did much towards re-establishing Vedic observances. He is said to have belonged to the Khyen tribe, but on conversion to Hinduism, he declared his caste to be that of High S'údra, just as the next dynasty—the Koch—called themselves Rájavaṁśís. He removed the capital to Kamaṭhapura,* on the western bank of the Dharlá in Koch Bihár. The ruins still exist, and are described by Dr. Buchanan-Hamilton who visited them in 1809.† He says that the city was very extensive, being no less than 19 miles in circumference, of which five were protected by the Dharlá and the rest by a rampart and a ditch. The city was built on the usual plan, enclosure within enclosure, wall within wall, the king's palace occupying the centre of the whole.

Chakradhvaja, Nílambara.

His son Chakradhvaja succeeded him, and the latter was in turn followed by his son Nílámbara, who attained to great power. His dominions included the greater part of Kámarúpa, Goálpáṛá and Raṅgpur, and also part of Bengal. His attempts to extend his dominions were facilitated by the struggles which the Afg͟hán Kings of Bengal were then making to maintain their independence of the Delhi Emperors.

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* He was on this account known as Kamaṭheśvara. It is doubtful how far Níladhvaja's empire extended, and it is not unlikely that in some portions of Eastern Kámarúpa other rulers were at the same time exercising sovereign rights. The Musalmán historians of the time sometimes refer to Kámarúpa and Kamaṭha as if the kingdoms were distinct, and sometimes speak as if the terms were synonymous and referred to one and the same country. "Comotay" is shown in the Map in Blaev's Theatrum Orbis Terrarum, Vol II (Amsterdam 1650); but the map is too sketchy to enable the boundaries of the country to be ascertained from it.

† Buchanan-Hamilton's account is reproduced almost verbatim in Hunter's Statistical Account of Koch Bihár, p. 362. See also Statistical Account of Rańgpur, p. 314.

Nílámbara did much to improve communications, and amongst other works, constructed a magnificent road from Kamaṭhapura to Ghoṛágháṭa, a portion of which still forms part of the main road between Koch Bihár, Raṅgpur and Bogra. The fall of this monarch was in this wise. The son of his councillor, a Bráhmaṇ named Śauchí Pátra, was enamoured of the queen, and the king, hearing of it, ordered him to be killed and some of his flesh to be cooked. He then invited the father to a banquet, and, after making him partake of his son's flesh, told him what he had eaten and explained the circumstances under which the punishment had been inflicted. The councillor at once left the kingdom, under the pretence of making a pilgrimage to the Ganges in order to wash away the sin committed by his son. But his real object was revenge, and to obtain it, he went to Ḥusain Sháh, the Nawáb at Gauḍa, and telling him of the weakness of the kingdom, persuaded him to send a large army to invade it. The siege of Kamaṭhapura is said to have lasted for twelve years,[*] at the end of which period Ḥusain Sháh gave out that he was going to abandon the siege and return to his own country, but that before doing so, his wife wished to pay a visit to Nílámbara's Rání. Under this pretence some armed men were introduced into the city in litters, and with their aid the city was captured. Nílámbara was taken prisoner and put in an iron cage to be taken to Gauḍa, but he made his escape, and Buchanan Hamilton says that in his time the common people of Kámarúpa still looked for his restoration at some future date. The Assam chronicles fix 1498 A. D. as the date of the capture of Kamaṭhapura, and this date is confirmed by a contemporaneous inscription found by Mr. Westmacott, at Maldah bearing date 907 A. H. (A. D. 1501-2), which belonged to a Madrasah built by Ḥusain Sháh in commemoration of his conquest of Kamaṭha and Kámarúpa.[†] The author of the Riáẓ refers to the conquest of these and other places, and mentions Rúpa Náráyaṇa Pála, Kuṁwar Gosa, Lakkhan and Lachhmi Náráyaṇa amongst the princes subdued. Ḥusain Sháh left his son Dányál with a strong army to complete the conquest, " but when the rains set in and the roads were closed " the Rájá issued with his men from the hills and in a short time they were all killed." A very similar account is given in the Fatḥiyah i 'Ibriyah, from which it appears that the Rájá who drove out the Musalmáns was the A'hom king.*

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[*] This is doubtless an exaggeration.

[†] J. A. S. B. 1874, p. 281. A. D. 1498 is also accepted by Blochmann as the correct date (J. A. S. B. 1872, p. 79).

Turbuk's invasion.

A few years later (1506 A. D.) a Paṭhán named Turbuk is said to have advanced as far as Koliabar, where he defeated the A'homs and was not finally expelled from the Province until 1532 A. D., when he was defeated and slain, and his army chased as far as the Karatoyá river. This invasion is recorded in the Ahom histories, but is not mentioned by Musalmán writers. The Mariás are said to be the descendants of prisoners taken in this war.†

Earlier Musalman invasions.

Although Ḥusain Sháh's invasion constituted the first serious attempt of the Muhammadan rulers of Bengal to permanently occupy Kámarúpa, accounts are not wanting of earlier invasions which, however, seem to have partaken more of the nature of filibustering expeditions than of real attempts at conquest.‡

G͟hiyás̱u'd-dín Bahádur Sháh is reported to have invaded Assam about 1220 A. D. and to have ascended the Brahmaputra as far as Sadiyá, but in the end he was defeated and driven back to Gauḍa §

Ik͟htiyáru'd-dín Yuzbak Tug͟hril Khán invaded the country in 1256-57 A. D. For a time he was successful and he celebrated his conquest by erecting a mosque, but, when the rains set in, and the country was flooded, large numbers of his men died. The king of Kámarúpa then returned from his hiding place in the hills and gave battle. Tug͟hríl was killed and his army defeated, and only a few escaped to Bengal to tell the tale.|| Muḥammad Sháh, son of Tug͟hluq Sháh,

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* Blochmann, J. A. S. B. 1872 pp. 79 and 336. The general account of the Khyen dynasty given above is taken from Guṇábhirám's *A'sám buranji.*

† In the Fatḥiyah i 'Ibriyah it is said that they are the descendants of prince Dányál's army. As Turbuk's name is not mentioned in Musalmán histories, it is possible that the name is an Ahom designation of Dányál or some other commander of the forces left by Ḥusain Sháh in Assam.

‡ I do not mention Bak͟htiyár K͟hilji's invasion, because it has been shown that he did not, as was once supposed, enter Assam and cross the Brahmaputra at Gauháṭi, but that he marched northwards along the Karatoyá river which formed the boundary of the kingdom of Kámarúpa.

§ Guṇábhirám's *A'sám buranji* p. 81.

|| Guṇábhiráma's *A'sám buranji* p. 82 and Tabaqát i Náṣirí 263. The practise of flooding the country here referred to was common in early warfare in this part of India. Ḥusain Sháh's second invasion of Tippera was frustrated by a similar operation (Long's Analysis of the Rájmála, J. A. S. B. 1850 p. 543). Cunningham (Arch : Surv : of India Vol XV p. 170) mentions a tradition that Mug͟híṣu'd-dín was killed near Sonárgáoṅ, but it is not quite certain that the same person is referred to, and in any case the version given in the text seems to be more authentic.

invaded the country in 1337 A. D. He sent "100,000 horsemen well "equipped to Assam; but the whole army perished in that land of "witchcraft, and no trace of it was left. He sent a second army to "avenge the former disaster, but when they came to Bengal, they "would go no further, and the plan had to be given up."*

In the reign of Barbak, some time about 1460 A. D., Ismá'il G̲háẓí, the celebrated Pír, is said to have defeated Kámeśvara, king of Kámarúpa. The story is told at length in a manuscript found by the late Mr. Damant in the possession of a fakír in charge of Ismá'il G̲háẓí's tomb at Kuntá Duár, Raṅgpur, but no reference is made to the subject in any Assam Chronicle or tradition.†

The records of these earlier Muhammadan invasions are very scanty, and very few traces of them now remain, beyond a few ruined fortifications (such perhaps as the Baidargaṛh already referred to), a few occasional finds of coins and the names of places indicating a previous Musalmán occupation.‡

Baro Bhuiyas.

Before proceeding further, it is necessary to give some account of the Báro Bhuiyás. It is generally admitted that they were foreigners, but accounts differ as to the circumstances under which they came to Bengal & Assam. Buchanan's version is that twelve "persons of very high distinction, and mostly named Pála, came from the west and settled" at Mahásthán. He was of opinion that they belonged to the Bhungiyá tribe. Cunningham on the other hand thinks that they were Bráhmaṇs and that the name Bhuiyá is a corruption of Bhumihára, a term applied to them as indication of the fact that they had taken to cultivation as a means of livelihood. He says that they still call themselves Bábhan, and claim to be Bráhmaṇs, but that their enemies say that they are the descendants of men of low caste whom Jarásandha raised to the priesthood. He mentions that they form a large part of the population of Magadha, the chief representative of the clan being the Rájá of Ṭekári, and from this he surmises that the Pála Rajas "must have been of "this caste, as they would appear to have been descendants of some of "the Báro Bhuihár Pálas, while in their inscriptions they are silent as "to their ancestry."

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* Alamgírnámah, p. 731.

† J. A. S. B. 1874, p. 216.

‡ 30 silver coins were recently discovered near Gauháṭí by a cooly working on the Assam-Bengal Railway. They bore dates from 1310 to 1399 A. D. Most of them were coins issued by the independent Sulṭáns of Bengal. Maḥmúd Sháh II, G̲hiyáṣu'd-dín Bahádur Sháh, Ilyas Sháh, &c. A previous find of 33 coins at Gauháṭí in 1880 formed the subject of an article by Dr. Hoernle in the J. A. S. B. of 1881, p. 53.

Buchanan's identification of the Báro Bhuiyás with the aboriginal tribe called Bhungiyá or Bhuiyá was endorsed by Dalton and other writers, but Dr. Wise has made it clear that the word "Bhuiyá" has nothing to do with caste but is simply a word formerly used to denote a chief or ruler.* He shows that one at least of the "Bhuiyás" was a Musalmán, and quotes Janic as follows:—"Non se tamen dixere reges sed *Boiones*, quasi forsan Principes." Bhuiyá therefore simply means chief, and connotes nothing regarding the caste of the persons to whom it is applied.

Why these Bhuiyás should always be referred to as 12 in number is less clear. It may be that the term was originally "Baṛ" or "great," and somehow got changed in course of time to Báro or twelve; but this seems unlikely. All that can be said in explanation is that twelve seems to be a favourite number to be fixed for councillors or feudatories in the constitution of kingdoms in this part of India The Rájá of Jaintiá had twelve *dalais*, and we shall see subsequently that when Viśva Siṁha came to the throne, he appointed twelve chief Ministers of State.†

The tradition current in Assam regarding the immigration of the Báro Bhuiyás of this Province is as follows:—A Rájá of Kamaṭhapura named Durlabha Náráyaṇa went to war with another Rájá named Dharma Náráyaṇa, who called himself Gauḍeśvara—the Lord of Gauḍa.‡ When peace was concluded Gauḍeśvara§ sent seven houses of Bráhmaṇs and seven of S'údras (Kayasthas) to Durlabha who settled them on his frontier as lords of the marches and gave them lands and slaves. From the position accorded to them, it seems certain that they must have been persons of position in their own country. The names of the seven Bráhmans were Kṛishṇa Paṇḍita, Raghupati, Rámavara, Lohár, Báyan, Dharma and Mathurá; and of the seven Kayasthas—Hari, S'rí Hari, S'rípati, S'rídhara, Chidánanda, Sadánanda and Chaṇḍivara. The last mentioned, who was the ablest and most learned, was chief of the Báro Bhuiyás, and acted as their priest, from which fact he was also known as Devídása.* A story is told of Chaṇḍivara to the effect that he and the other Bhuiyás† went home to fetch their families, and that on starting to return they were seized by Gauḍeśvara and cast into prison Shortly afterwards a paṇḍit from Benares visited the country and defeated all the learned men there in argument. The king confronted him with Chaṇḍívara, who soon overcame him, and he left the country covered with shame at his defeat. This so pleased the king that he at once released Chaṇḍívara and his companions and supplied them with boats in which to return to Kámarúpa. They went and settled at Paimaguṛí, where Chaṇḍivara earned the gratitude of the peasantry by constructing a bund in Baṅgsi pargana, which the Chaudhri of the place, by name Gandharva Rái, had in vain attempted to make. Subsequently the Bhotiás raided and carried off a number of people including Chaṇḍivara's son Rájadhara. Gandharva Rái fled to the south bank of the Brahmaputra, but Chaṇḍivara with the other Bhuiyás followed up the Bhotiá raiders and rescued their captives.

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* It is in fact simply the Sanskrit equivalent of the Persian word Zamíndár. The title was sold by the last kings of Cachar to any one willing to pay for it. Dr. Wise's essays on the Báro Bhuiyás of Bengal will be found in the J. A. S. B. 1874, p. 197 and 1875, p. 181.

† Cf. also the 12 *misals* of the *K͟hálisa*.

‡ The whole story is told at length in the *Guru Charitra*.

§ It appears that this title was often claimed, even by petty princes, and in the time of the visit to Pauṇḍradeśa of Jayapíḍa, the Rájá of Káśmírá (779-813 A.. D.) there were no less than six petty princes in the province of Gauḍa or Varendra all of whom claimed the title of Gauḍeśvara. The same state of affairs is said by Táránátha to have prevailed in the beginning of the ninth century, immediately before the rise of the Pála princes. (Arch. Sur. of Ind. Vol. XV, p. 111.)

After Nílámbara had been overthrown by the Musalmáns under Ḥusain Sháh and the latter had in their turn been expelled by the A'homs, the country appears to have been broken up, as it had often been before, into numerous petty kingdoms, and amongst the rulers of these small principalities were twelve Bhuiyás, but whether these were descendants of the Bhuiyás imported by Deveśvara or not is uncertain.

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* His son Rájadhara was the great grandfather of S'aṅkara Deva, the celebrated religious reformer.

† The following list of Bhuiyás is taken from Lakshmináráyaṇa's *Purushávali*: Cháru, Uguri, Kusum, Kália, Lukí, Jhárgáoñ, Kabila, Karṇapur, Phulguṛi, Bijní, Dighala and Pratáp. Of these Ugurí, Lukí, Jhárgáoñ, Karṇapur, Phulguṛi, Bijni and perhaps Dighala are names of places, and Cháru, Kusum, Kália, Kabila and Pratáp are the names of rulers whose states are not mentioned. The twelve Bhuiyás were not the only rulers in the country during this period of anarchy. Amongst others, two brothers named Chandana and Madana are mentioned by Buchanan Hamilton as having ruled for eight years at a place called Marálávása about twenty miles north of Kamaṭhapura. In a lecture by Bábú Rám Chandra Ghosh, quoted at page 407 of Hunter's Statistical Account of Koch Bihár, it is stated that Chandana and Madana were the children of Hariá Maṇḍal by his wife Jírá. But as will be seen hereafter, there is not sufficient evidence to justify this statement. The same Bábú adds that Chandana became king in 1511 and was succeeded by Viśva Siṁha in 1524, after a reign of thirteen years. Guṇábhirám mentions the kings of the following places as having been subdued by Viśva Siṁha:—Ḍimuriá, Beltola, Ráni, Luki, Bogái, Pántan, Boko, Bangáoñ, Moirápur, Bholágáoñ, Chaigáoñ, Barnagar, Darrang, Karáibári, Attiábári, Kamaṭhabári, and Balarámpur.

THE KOCH KINGS OF KÁMARÚPA.

Bisu and Sisu.

In the meantime the Koch chiefs were gradually rising to power. In tracing their history I shall follow generally the account given in the *Purushanáma* or *Vaṃśávali* of Rájá Lakshmi Náráyaṇa Kuar, but shall collate this with other versions and endeavour, where they differ, to show which is most probably correct.

The account begins with the usual attempt to prove that the ruling tribe was of Kshattriya descent. It says that Sahasra, son of Rájá Haihaya stole the milch cow of Jamadagni. Paraśuráma, son of the latter, on hearing of the theft, slew Sahasra and restored the cow to his father. In revenge, Sahasra's sons, taking advantage of Paraśuráma's absence, killed Jamadagni and cut off his head. When Paraśuráma returned, he waged a war of extermination against the Kshattriyas and recovered the head of Jamadagni, whom he then restored to life. The remnant of the Kshattriyas, flying before the wrath of Paraśuráma, assumed the guise of Meches and discarded the sacred thread. They multiplied rapidly, and eventually a chief was born whose name was Hidri, and who had twelve children—Pánbar, Phedelá, Aorko Guabar, Fed Fedu, Barihana, Juknabar, Káthya, Baihágu, Meghá, Goratá, Jogai and Dukharu.* These sons founded twelve families and from one of these sprang Hariá Maṇḍal. One day, when his wife Hírá was carrying his mid-day meal to him in the fields, she was met by S'iva, who had assumed the form of Hariá Maṇḍal, and in that guise consumed the food intended for her husband and had intercourse with her. There was some misunderstanding between her and her husband in the evening, but matters were soon put right, for S'iva appeared to Hariá in a dream and informed him that it was he who had eaten his food and taken such liberties with his wife, and stated that as a result of his intimacy with her, a son would be born who would rise to be a mighty chief. To complete the story, the legend adds that the lady was none other than an incarnation of Párvati, who had been made to take the form of a Mechání as a punishment for causing S'iva's death by a curse. Ten months later, on the 1st day of the Bihu, the promised son was born, amidst universal rejoicings, and was named Bisu, in commemoration of the time of his birth. By his second wife Jírá or Dhírá, Hariá Maṇḍal himself begot a son, whom he named S'iśu.

The *Purushanáma* continues, that in his boyhood Biśu was known as the chief of cowherds. When he grew up, he at once began to extend his father's principality by bringing the country ruled by the

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* The occurrence of the number twelve will again be remarked. The *Purushanáma* also speaks of the twelve sons of Sahasra.

Bhuiyás under his power. He defeated the Bhuiyás of Ugurí and Lukí* but was defeated by Cháru Bhuiyá. While wandering about after this defeat, he was met by Párvatí disguised as a Mecháni, and following her advice, he again attacked Cháru Bhuiyá at the time of the Baiśákh Bihuá, when his soldiers had dispersed for the festival, and thus overcame and killed him and the few soldiers that were left with him. Following up this success, he defeated and slew the Bhuiyás of Phulguṛi and Bijni, the former of whom is described as being of the race of S'iva.† He gradually extended his power, and after defeating all the Bhuiyás, went and‡ built a magnificent city in Koch Bihár. He worshipped S'iva and Durgá and gave gifts to the disciples of Vishṇu. Other accounts mention that he assumed the Hindú name of Viśva Siṁha and that his brother S'iśu called himself S'iva Siṁha, while the men of his tribe who accepted Hinduism described themselves as Rájavaṁśis. He gave alms to the priests, and astrologers, and also to the poor and to the visitors from distant countries. He made S'iśu Yuvarája, and appointed twelve ministers from the twelve chief families of the Meches, *viz* :—Two councillors (one for foreign and one for internal affairs), a commander of the army, a bráhmaṇ, an astrologer, a physician, a betelnut-bearer, a cook, a store-keeper, an accountant, a *thár* (prophet) and a porter. He also introduced a regular state organization by appointing *Ṭhakuriás* over 20 coolies, *Saikiás* over 100, and *Hazáris* over 1,000, *Umrás* over 3,000, and *Nawábs* over 66,000. Excluding the old and the young, he took an account of his able-bodied male subjects, and found that the number of persons fit to carry arms amounted to no less than 5,225,000. He is said to have possessed numberless elephants, horses, asses, buffaloes, and camels. It is related that he went to make war on the A'homs, but fell short of provisions on the way, and thinking it wrong to plunder, returned home.§ He was preparing to undertake a second expedition, when Káli appeared to him and told him not to engage in war himself. She told him instead to marry, and prophesied that he would have eighteen sons, who would conquer the whole world. In accordance with the divine mandate, he married in one day eighteen wives according to the Gandharva ceremony. Two of these wives came from Nepál, two from Kámarúpa, one from Káśmira, four from Benares, three from S'oṇitapura (the Modern Tezpur) and two from Mithilá. Ten months later, each of his wives gave birth to a son, the names of whom were Nara Siṁha, Mallá Deva, who was afterwards known as Nara Náráyaṇa, S'ukladhvaja, Gosáiñ Kamala, Maidan, Rám Chandra, S'úra Siṁha, Mána Siṁha, Mechá, Vṛishaketu, Ráma Náráyaṇa, Ananta, Dípa Siṁha, Hemadhara, Megha Náráyaṇa, Jagat Chandra, and Súrya.

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* If this account can be relied on, it seems to prove that the Koch Kingdom rose in Kámarúpa and gradually extended itself westwards, instead of beginning in Rańgpur as is generally stated.

† It may be interesting to note that the use of firearms is referred to in the account of his battles with the Bhuiyás.

‡ Guṇábhiráma says that he took from them as tribute muga silk, cotton, copper, tin, lead, silver, gold, iron, potters' clay, &c.,

§ The A'hom version which says that he was defeated and made tributary, is more likely to be the real explanation of his return.

Being undecided as to who should succeed him, Viśva Siṁha, following the advice of Sadá S'iva, caused 18 different articles (including gold, silver, iron, earth, &c.) to be tied up in bundles, and asked his sons to bring each one a bundle. Nara Siṁha brought the bundle of gold, and so was appointed to be ruler of a foreign country. Mallá Deva brought the bundle of earth, and was thus selected to succeed his father as king. S'ukladhvaja, who brought the bundle of iron, was made Yuvarája, while Gosáiñ Kamala, because he brought the bundle of wheat, was declared to have for his inheritance unspotted fame and pure glory, and to be destined to construct roads, monasteries and tanks. Minor appointments were allotted to the other sons, according to the contents of their bundles.

Viśva Siṁha died, after reigning 25 years, of sores brought on by the curse of a Bráhmaṇ,* but before his death, he enjoined his ministers never to get brides for his family from foreign races, but only from amongst the Mech, Koch and Kachári tribes. It is said that he was carried up to heaven from S'oṇitanagara in a chariot driven by Nandí, who had been sent to earth by S'iva for this purpose.

Guṇábhirám tells a story which is not referred to in this Purushanáma. He says that Viśva Siṁha re-discovered Kámákhyá. The story runs that he went to Niláchala, where he found only a few houses of Meches. No one was at home except one old woman, who was resting under a fig-tree, where there was a mound which she said contained a deity. Viśva Siṁha prayed that his followers might be caused to arrive, and his prayer was at once granted. He therefore sacrificed a pig and a cock, and resolved, when the country became quiet, to build a golden temple there. He ascertained that the hill was the site of the old temple of Kámákhyá, the ruins of which he discovered, while the image of the goddess herself was dug up from under the mound. Subsequently he re-built the temple, but instead of making it of gold, he placed a gold coin between each brick. He brought Bráhmaṇs from Kannauj, Mithilá, Benares, &c., to perform religious ceremonies at this and other temples. Guṇábhirám adds that in Viśva Siṁha's time Raṅgalugaṛh was the eastern boundary of Koch Bihár.

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* He had asked the Bráhmaṇ why people worship the big toe of a Bráhmaṇ, and on being told in reply that it was because it contained white blood, which is the blood of Brahmá, he had his toe pierced through with a chisel. No white blood was seen, but red blood flowed and could not be stopped, and so the Bráhmaṇ died saying, "As you have caused me this pain, so you also shall die of sores."

Nara Narayana.

Taking advantage of the absence of Mallá Deva and S'ukladhvaja, who had been sent to Benares to study under a hermit of the name of Brahmánanda, Nara Siṁha seized the throne. News of this occurrence was sent to Mallá Deva by his nurse, and he at once returned with S'ukladhvaja and defeated Nara Siṁha, who fled to the Morang country. Mallá Deva and S'ukladhvaja defeated the Morang king, and Nara Siṁha fled to Nepál, but the king of Nepál was similarly defeated, and he then took refuge in Kaśmíra. Being unable to cross the passes Mallá Deva gave up the pursuit and returned to his own country. The *Vaṁśávali* says that Nara Siṁha subsequently became ruler of Bhotán, and that Pallavas, or local rulers were appointed by him. Their names were Dagar, whose jurisdiction lay in the east; Tongsár in the south; and Páro in the west. Three Jongpons are also mentioned as rulers over Tasirjim, Púrṇakhátá and Undipherá, respectively, and reference is also made to the "great dewan of Dunerkál," the 'lord of correspondence.'

Returning to Mallá Deva and S'ukladhvaja, it is stated that on their return Mallá Deva became king and assumed the name of Nara Náráyaṇa. He made S'ukladhvaja his Yuvarája, under the name of S'ílarái, the king of the kites. He at once began to turn his attention to the extension of his kingdom, and first of all, he determined to carry out the decision formed by his father to conquer the Áhoms. Bearing in mind the cause of his father's failure, he first of all arranged for the construction of a road as far as a place called Parasu Kuthar, and this task was entrusted to Gosáiñ Kamala. The latter set to work with vigour, and at the end of a year had completed the road, and had also constructed tanks at regular intervals along it.* Nara Náráyaṇa then called in Hindú paṇḍits and astrologers, and, after following the usual Hindú observances, prepared to start. But before doing so, he organized a Kachárí dance on the banks of the Sankosh, and calling in the aid of a Shamanist, went through the aboriginal rites of his tribe, this leaning to his old tribal superstitions being justified in the *Vaṁśávali* by the statement that S'iva himself had directed him to observe them. He then started. One night he halted at Tamtumani, where twelve tribes brought him presents, in consequence of which the place was called Báraḍala. On another occasion he stopped at Bhramarakuṇḍa where he built a fort and a monastery on a hill called Nil Khámár, a family of Kacháris being appointed to attend on Triśúladeví, the goddess of the place. It is said that he fixed the Gosáiñ Kamala A′li as the boundary north of which the Kachári, Koch and Mech aboriginal forms of worship should be practised, while south of it Hindú observances were to be followed. Further on he halted at Siṅgiri Parbat, and after that on the Bharali.

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* The remains of this road are still visible from North Lakhimpur; the portion which runs through North Kámrúp and the Mangaldai subdivision is still known as the Gosáiñ Kamala Áli.

In the meantime, the A′hom king who had heard of the invasion, summoned a meeting of his councillors, and with their advice, caused an iron goat to be made. This goat he sent to Nara Náráyaṇa, saying that if he could sever its head from its body at one stroke he should have his kingdom, but not otherwise. Nara Náráyaṇa offered two goats to Káli, and then taking a sharp sword struck off the head of the iron goat with such force that the sword buried itself in the earth. On hearing of this, the A′hom king was filled with fear, and fled to Charái Kharang.* Nara Náráyaṇa then entered Gaṛhgáoñ.† Finding that the A′hom king was not disposed to fight, Nara Náráyaṇa, after halting for a year at Gaṛhgaon sent word to him saying that if he wished to fight he should come prepared, and that if he did not come, and at the same time did not surrender, he would go and attack him at Charái Kharang. On receiving this message, the A′hom king agreed to acknowledge himself a feudatory of Nara Náráyaṇa, and sent as hostages a prince named Sundara and twenty families of the Gharmátha clan, together with one pot of gold and another of silver, 60 elephants and 60 pieces of cloth.‡

After that the Koch king left Gaṛhgáon and proceeded first to Maraṅg and thence to Demera.

* According to other accounts, including that in Gunábhirám's *A′sám Buranji*, the A′hom king is said to have for a time averted defeat by sending forward an army of S′údras mounted on cows. A similar stratagem is referred to in the *Rájamálá* or Chronicles of the kings of Tippera.

† The *Purushanáma* states that this was formerly the capital of the Chutiyá Rájá. The A′homs were unable to conquer this king and so made peace with him. Their ruler married his daughter, and through her discovered that her father's supremacy was due to the possession of a golden cat. He made his wife steal this for him, and when he had got it, he attacked and killed the Chutiyá Rájá, whose sons fled for refuge to the Miri and Miching country.

‡ Sundara and his comrades were subsequently released owing to Sundara having succeeded in worsting Nara Náráyaṇa in a gambling contest. The A′hom chronicles add that when they returned to their own country, they took back goldsmiths, blacksmiths, and other artizans with them. (Guṇábhirám's *A′sám Buranji* pp. 68 and 117.)

Subsequently he deputed Sílarái to go and conquer Harmeśvara, the king of Hiḍamba or Cachar. It is related that Sílarái broke open the gate of the capital with two strokes of his riding whip.[*] Seeing this, Harmeśvara feared to offer resistance and at once made his submission. He gave 84 elephants and other presents and agreed to pay an annual tribute of 70,000 silver and 1,000 gold mohars and 60 elephants.[†] The Koch king then sent messengers to the Rájá of Maṇipur, calling on him to submit and pay tribute, and the Rájá feeling himself too weak to resist so powerful a prince, at once complied with his requisition. His tribute is said to have been fixed at Rupees 20,000, 300 gold coins and ten good elephants. After this Sílarái gave battle to the king of Jaintiá and slew him with his own hand. Nara Náráyaṇa set up the deceased Rájá's son as king, after making him promise to pay an annual tribute, and then despatched Sílarái to wage war against the king of Tippera. It is said that Sílarái's army consisted of 40,000 men, and that in the battle which took place, no fewer than 18,000 men of the Tippera army were slain. The king is said to have met his death, like the king of Jaintiá, at the hands of Sílarái himself. Nara Náráyaṇa placed the deceased king's brother upon the vacant throne, and made him pay tribute to the extent of Rs. 10,000, one hundred gold mohars and thirty war horses. In the meantime, Víryavanta the Rájá of Khairam, having heard of Nara Náráyaṇa's prowess and wishing to avoid the fate which had overtaken the kings of Jaintiá and Tippera, hastened to make submission. His tribute was fixed at 15,000 Rupees, 900 gold coins, 50 horses and 30 elephants. He was also made to promise not to stamp coins in his own name, but in that of Nara Náráyaṇa.[‡] The next victory was over the Rájá of Ḍimuriá who was taken prisoner, but was subsequently released on his undertaking to pay an annual tribute of Rs. 7,000. In the course of this expedition, Nara Náráyaṇa is said to have straightened the course of the Brahmaputra opposite Páṇḍunátha, a place near the foot of the Niláchal hill, some four miles west of Gauháṭí. After stopping some time at a village named Robá, Nara Náráyaṇa determined to attack the king of Siratha (Sylhet), whose kingdom is described as being near Jaintiá, and who is said to have been a very powerful prince. Messengers were sent calling upon him to submit, but this he refused to do, and Sílarái was accordingly despatched with a strong force to overcome him. He met the army of the Sylhet king, and a battle took place which lasted three days. At the end of this time as the scales of victory still hung in the balance, Sílarái became impatient, and so seizing his sword and shield, he rushed forward like the kite, from which he took his name, and attacked the hostile army. It is related that 100,000 soldiers fell before his all-destroying sword, and that at last the king of Sylhet himself was slain. The king's brother Asirái then tendered his submission and returned with Sílarái to the court of Nara Náráyaṇa, who appointed him king in the place of his brother and fixed his tribute at 100 elephants, 200 horses, 300,000 Rupees and 10,000 gold coins.*

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[*] Other similar feats are attributed to Sílarái. On one occasion he is said to have leapt over the Bharali river on the back of his war horse.

[†] This story of the invasion of Cachar by Nara Náráyaṇa is confirmed by a tradition current amongst the Deháns, a small tribe of that district, who claim to be descended from the Koches who invaded the district. According to their account, however, the leader of the expedition was not Sílarái, but his brother Gosáiñ Kamala.

[‡] No coins of this king have as yet been found, and the earliest coin of the Rájás of Jaintiá which I have seen is dated more than a hundred years later. Excluding Áhom coins, the only extant coins of this period stamped by kings in Assam are those issued by Nara Náráyaṇa and his successors.

Being thus victorious in three directions, Nara Náráyaṇa determined to invade the kingdom of Gauṛ (Gauḍa). Before doing so, he visited the temple of Kámákhyá, which he found in ruins. He intended to rebuild it, but being possessed by S'ani (or the planet Saturn) he postponed this pious act until after his proposed expedition. This incensed the goddess against him, and his army, which was led by Sílarái, was defeated by the Pasha of Gauṛ, after a fight which lasted for ten days. Sílarái himself performed prodigies of valour, and after his weapons had been broken he disdained to fly, and so continued to fight with rushes until they also were exhausted, and he was taken prisoner. Subsequently, through the favour of Káli, he succeeded in curing the Pasha's mother, who had been bitten by a snake which had been sent into her presence by Sílarái in the form of a rope. In return for this cure, Sílarái was released, and the Ganges was fixed as the boundary between the two kingdoms.

On his return home, he and his brother at once set about the erection of the Kámákhyá temple.† Twice they erected a temple of stone, and each time it fell in a night, Then Párvatí appeared in a dream and said that the Musalmáns had destroyed the old stone temple, and as it was now the Kali Yuga, the new one should be constructed of bricks. The brick temple, was constructed in six months, and then Nara Náráyaṇa consecrated it with numerous sacrifices, including 140 men, whose heads he offered to the goddess on copper plates.* He made a grant of land for the maintenance of the shrine, and gave away alms to the extent of Rs. 25,000. He also caused a statue of himself to be made and placed within the temple.† At this time he caused roads, monasteries and tanks to be constructed, and trees to be planted. Under his auspices the S'ástras were published and the Ratnamálá was composed, and even the common people were made to study religious books. S'áktism was the State religion, but Vaishṇavism was more than tolerated, and great honour was done to S'aṅkara Deva, Deva Dámodara, and other Vaishṇava divines. The country enjoyed a period of peace and religion, and trade throve exceedingly.

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* Sylhet was conquered by the Musalmáns in 1384 A. D., but may have been temporarily independent at the period here referred to, which was a troublous one in Bengal. Or it may be that the king of Sylhet here referred to was the ruler of Láur, who long continued to maintain his independence of the Musalmán invaders.

† An inscription within the temple records its erection by Sílarái during the reign of his brother Nara Náráyaṇa. This inscription which bears date 1487 S'ak. (1565 A. D.) will be referred to again further on. Other accounts say that the temple took ten years to build. (Gunábhirám's *A'sám Buranji* page 68.)

Two years later, the Gauṛ Pasha's mother died, and Nara Náráyaṇa then combined with Akbar to attack him. Sílarái invaded his kingdom with an army from the east, while Rájá Mán Siṅgh, who was in command of the Imperial army, advanced upon him from the west.

The ruler of Gauṛ being thus attacked from two sides at the same time was easily defeated, and his kingdom was then divided between the Koch king and the Emperor of Delhi. The Pasha himself fled to the country of the Feringhis.

While engaged on this expedition, news came from the capital that a son had been born to Sílarái.‡ The latter, however, was destined never to see him. He was attacked by small-pox and died on the banks of the Ganges, after enjoining his brother Nara Náráyaṇa to take care of his boy. Nara Náráyaṇa performed the funeral ceremonies with great pomp, and at the conclusion sacrificed a bull.

After Sílarái's death, a long period of peace ensued, during which the people enjoyed great prosperity, while Nara Náráyaṇa gave such encouragement to religion that he became known as "the pious king."

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* The offering of human sacrifices was by no means uncommon among the S'áktas of former times. Similar sacrifices were frequently offered at Sadiyá, and at Beltola in Kámrúp, and it was the abduction of four British subjects for this purpose which led to the annexation of Jaintiá in 1835.

† Two statues, said to represent Nara Náráyaṇa and Sílarái, are still to be seen within the temple. An older figure carved in the rock on the road leading up to it is said to represent Naraka, the first-recorded guardian of the shrine.

‡ It is related that in honour of this event grants of Brahmottar land were made in the village of Chinakoná (in the Maṅgaldái sub-division.) This grant still exists.

In the meantime Silarái's son, whose name was Raghu Rái, was growing up. He was a great favourite with the king, and when he attained the age of 16, two girls were given to him as wives. It is added that subsequently the number of his wives reached 120.

Shortly after Raghu Rái's marriage, Nara Náráyaṇa himself was at last blessed with a son, to whom he gave the name of Lakshmí Náráyaṇa.* Up to this time, Raghu Rái had lived in hopes of succeeding his uncle; but hearing that he was now likely to be passed over in favour of the latter's own son, he left the capital with a small following, and settled down at Baṛanagara, or Vijayanagar, where he excavated a tank and built a town called Ghilajaipur. Nara Náráyaṇa sent a messenger, named Para Kárji, to recall him; but he refused to return, and when Kárji invested the place in order to seize him, he fought with, and defeated him. On hearing of this, it is related that Nara Náráyaṇa professed to be pleased at his nephew's prowess, and as an acknowlegment thereof, sent him his wives, together with a large amount of money and jewels from the royal treasure-chest. A few months later, a heavy flood occurred, and taking advantage of it, Raghu made an expedition in boats and raided Bair Baku. When Nara Náráyaṇa heard of this, he went with an army to chastise him, but was prevented from attacking him by Raghu sending his 120 wives to attack Nara Náráyaṇa's army. When the latter heard of this, he determined not to fight and so came to terms.

The kingdom was divided into two parts, and it was settled that Raghu should rule the country east of the Sankosh and that Lakshmí should succeed his father as Rájá of the country west of that river. Raghu continued to reside at Baṛanagara. He visited five places of pilgrimage,—Gaṇeśa, Kedára, Gokarṇa, Garṇa, and Kámeśvara; and re-built the Maṇikúṭa Temple, which had been broken by the Musalmáns.† He endowed it with grants of land, and when it was finished, he sacrificed at the shrine 700 men, whose heads he offered to the goddess in copper plates. He had a large number of sons, including Paríkshit, Indra Náráyaṇa, Jádurái, Bali Náráyaṇa, and Mána Siṁha. He is said to have been devoted to religion and to have made liberal gifts to Brahmáns. It is related that he buried 30,00,000 Rs. under the staircase of his palace. In the end he was killed by a demon (*daitya*) sent by an ascetic whose company he had exhorted his son Paríkshit to eschew.

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* It is said that Nara Náráyaṇa married Kamala-priyá, the daughter of S'aṅkara Deva's brother Rám Rái. According to other accounts, however, it was Sílarái who married her.

† This is the Hayagríva Temple at Hájo, which stands on the hill called Maṇi. An inscription in the temple, dated 1583 A. D., mentions Raghu Deva as the king under whose orders it was re-built.

Paríkshit, on the death of his father, went to Prágjyotishapura and worshipped three times at Kámákhyá. An astronomer attached to the temple foretold that unless he became king within two days, he would not get the kingdom for twelve years, and he accordingly set sail and proceeded with all haste to Baṛanagara, where he was hailed as king. It is said that his boatmen were so exhausted by their exertions that on arriving they all lay as if dead, and were only brought back to life by the tender ministrations of 140 girls (sent for the purpose by Paríkshit) who anointed their bodies with oil and acid fruits, and then passed the night with them. Next morning, says the *Vaṁśávali* each boatman was married to the girl with whom he had slept. Paríkshit is said to have built a town where North Gauháṭi now stands, and to have mounted cannon at Paṇḍunátha, which were still in position at the time when the *Vaṁśávali* was composed. Subsequently war broke out between Paríkshit and Lakshmí Náráyaṇa, and the latter being worsted, went to Delhi, and giving his sister to the Emperor in marriage, implored him to send an army to his assistance.

In accordance with his request, Paransubha and Mukarram K͟hán were sent against Paríkshit. Paríkshit was defeated and then entrenched himself in a fort which he built on the banks of the Sankosh, which the Musalmáns besieged for a year without success. They then resorted to stratagem, and by floating rafts of plantain trees down the river by night, made Paríkshit believe that they had crossed it and were marching on his capital. Under this impression, he abandoned his intrenchments and hurried back to Vijayanagara.

In the meantime his brother Bali Náráyaṇa, after taking refuge for a year with a Bára Bhuiyá family residing at Maniárí village in Darrang, went to the Ahom king, Svarga Náráyaṇa, and invoked his aid against the Musalmáns. The latter took the field with a large army, and defeated the Musalmáns, who fled across the Karatoyá. Svarga Náráyaṇa then placed Bali Náráyaṇa, whom he re-named Dharma Náráyaṇa, in charge of the conquered country, the boundaries being on the east the Bharali, on the west the Karatoyá, on the north the Gomiri mountains, and on the south the hills of Siri.

COMPARISON OF THE VAMŚÁVALI WITH OTHER SOURCES OF INFORMATION.

The rise of the Koch dynasty.

Thus far the *Vaṁśávali* of Rájá Lakhshmí Náráyaṇa Kuar. I now refer briefly to other accounts of the events with which it deals.* And first of all, as to the parentage of Bisu and Sisu.

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* Minor points in which other accounts corroborate it, have been noted *passim* in the abstract of the *Vaṁśávali* given above.

Rájá Prasiddha Náráyaṇa's *Vaṁśávali* agrees with it in all particulars, and the account given by Guṇábhirám in his *Ásám Buṛanji* is also practically the same. In the latter, however, Hájo is mentioned as the father of Hírá and Jírá; it does not appear from his account that either of them had a husband, and Śiva is said to have been the father of Sisu as well as of Bísu. Buchanan Hamilton says that Hájo Koch had two daughters, Hírá and Jírá, of whom the former was married to Hariyá Mech. She had a son, Bisu, while her sister (whose husband is not mentioned) had a son, Sisu. He adds that Śiva was claimed as the progenitor of both Bisu and Sisu. The Raikat family of Baikuṇṭhpur claim to be descended from Sisu, and over that he was the brother and not the cousin of Bisu. Another account says that Chandan and Madan were the children of Hariyá Mech by his wife Jírá and that Śiśu and Bisu were born of his wife Hírá by the god Śiva.*

From these accounts we may, I think, conclude that Śiśu and Bisu were the children of Hariyá Mech by his wives Hírá and Jírá, and that the latter were daughters of Hájo, who was of the Koch tribe, a fact which is proved not only by the authorities mentioned above, but also by the fact that the existing representatives of the family still describe themselves as "Koch," and by the Musalmán names for the country, Koch Bihár and Koch Hájo. Ralph Filch also refers to Śukladhvaja as Shukl Koch. There is not sufficient evidence for assuming that Chandan and Madan belonged to this family.

The division of the country into two kingdoms.

There is less unanimity regarding the kings by whom the Koch kingdom was consolidated and extended and the period at which it was divided into two parts.

According to Buchanan Hamilton†, it was Hájo who founded the kingdom, and Viśva Siṁha who divided it into two parts, giving the position east of the Sankosh to Śukladhvaja and the position west of that river to Nara Náráyaṇa. The same version is given in the family history of the Rájás of Bijní. Other authorities however, agree with Rájá Lakshmí Náráyaṇa's *Vaṁśávali*. Bábú Rám Chandra Ghosh, to whose lecture reference has already been made, says that Nara Náráyaṇa "with the assistance and advice of his younger brother Śukladhvaja, "otherwise called Sílarái, extended his kingdom in all directions. He "conquered the whole of Kámarúpa and carried off in triumph the "*chhattra* or umbrella of the king of Assam. The king gave to his elder

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* Lecture delivered by Bábú Rám Chandra Ghosh before the Koch Bihár Hitaishiṇí Sabhá, and printed in Calcutta at the expense of the Ráj in 1865.

† Hunter's Statistical Account of Rangpur, page 351.

"brother, Nara Siṁha, the pargana of Paṅgá; and to his younger brother "S'ukladhvaja, together with the title of Rájá, he gave Bijní, Darrang, "Bentalí (*sic*, Beltola?) and the northern part of the Kámákhyá "kshettra."

In Biśveśvar's *Ásám Buranji*, the agreement is still greater. He says: "Rájá Nara Náráyaṇa, having no male issue, determined to appoint "his nephew Raghu Deva as his successor. When old, he had a son, and "Raghu Deva became hopeless. The latter therefore, quitted one day the "palace, under the pretext of going a hunting, but the Rájá, in order "to console him, allotted to him a portion of the Ráj."

The account given by Guṇábhirám on pages 59–71 of his *Ásám Buranji* also confirms that contained in the *Vaṁśávali*, and so does the allusion to the conquest of Gaṛhgáoñ in the Ahom chronicles, and also the Musalmán version of the events dealt with in the *Vaṁśávali* as described in the *Akbarnámah*, except that in the latter, Raghu's rebellion is said to have taken place on the death of Nara Náráyaṇa, and not during his life time.*

In addition, we have contemporaneous evidence in the shape of two inscriptions, one of which is inside the Kámákhyá temple and the other in the temple of Hayagríva at Hájo. The former runs as follows:

> "Glory be to king Malládeva, who by virtue of his mercy, is kind to the people; "who in archery is like Arjuna, and in charity like Dadhíchi and Karṇa; he is 'like an ocean of all goodness, and he is versed in many śástras; his character is "excellent, in beauty he is as bright as Kandarpa; he is a worshipper of Kámákhyá. His younger brother S'ukladeva built this temple of bright stones on the "Níla hillock, for the worship of the goddess Durgá, in 1487 S'aka (1565 A. D.). "His beloved brother S'ukladhvaja again, with universal fame, the crown of the "greatest heroes, who like the fabulous Kalpataru, gave all that was devoutly asked "of him, the chief of all devotees of the goddess, constructed this beautiful "temple with heaps of stones on the Níla hill in 1487 S'aka."

Amongst the stone figures in the interior of this temple are two which are said to represent Malládeva and his brother S'ukladhvaja.

The inscription inside the temple of Hayagríva may be translated thus:—

> "There was a ruler of the earth named Viśva Siṁha; his illustrious son, the "most wise king Malládeva, was a conqueror of all enemies. In gravity and "liberality and for heroism he had a great reputation, and he was purified by "religious deeds. After him was born his brother S'ukladhvaja who subdued

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* It may be explained here that Muhammadan historians refer to the countries ruled by Paríkshit and Lakhshmí Náráyaṇa as Koch Hájo and Koch Bihár respectively. Nara Náráyaṇa was known to the Musalmáns as Bál Gosaiñ, and S'ukladhvaja as Shukl Gosaiñ.

" many countries. The son of this Śukladhvaja was king Raghudeva, who was like
" the greatest man of the Raghu race : his glories spread out in all directions ; the
" lord of Kámarúpa, in obedience to the order of destiny, is the slayer of the wicked,
" who was like water to the flames of the fire of sorrow of the vast populace.
" Of the seeds of Śukladhvaja, a king was born of the name of Raghudeva, who
" consoles innumerable persons, and is a worshipper of the feet of Krishna ; the
" king coming of age had a temple built on the hillock called Maṇi hillock, in 1505
" Śaka (1583 A. D.) The most skilful and efficient artisan Śrídhara himself
" built it."

Apart from the authorities quoted in favour of the version given in the *Vaṁśávali*, it seems probable that that version is correct ; first, because it is far more detailed than any other, and secondly, because it is the version given by the descendants of Sílarái who would not have been likely to represent him as a subject of Nara Náráyaṇa if he had really been an independent prince. We may, therefore, accept the story as told in the *Vaṁśávali* as substantially correct.

The only alternative to accepting the version given in the *Vaṁśávali* is by supposing Sílarái to have outlived his brother and to have rebelled when Lakshmí Náráyaṇa succeeded him. This is the version given in the Akbarnámah (J. A. S. B. 1872, page 53), and if correct would simplify the meaning of the inscription in the temple at Hájo. The account given in the *Vaṁśávali* is however, so circumstantial that, in the absence of further evidence, it seems impossible to gainsay it.

MUSALMÁN INVASIONS DURING THE PERIOD DEALT WITH IN THE VAṀŚÁVALI.

The *Vaṁśávali* says very little about the relations of the Koch kings with the Mualmáns, and it will therefore be useful to supplement it in this respect by accounts drawn from other sources.

Kala Pahar's invasion.

And first should be mentioned the invasion of Kálá Páhár, otherwise known as Rájú, which took place in 1553 A. D. It is said that Nara Náráyaṇa was afraid to fight him, and allowed him to pass up the Brahmaputra unmolested. He was a convert from Hinduism, and like all apostates, was a zealous persecutor of the faith which he had before professed, so that his name is remembered to this day, both in Assam and Orissa, as the arch destroyer of temples and images. To him is attributed the destruction of the old temples at Kámákhyá and Hájo, but beyond these acts of sacrilege, he appears to have left no mark in the country. His invasion is not referred to in the *Vaṁśávali*, except incidentally in the statement that Nara Náráyaṇa rebuilt Kámákhyá " which the wicked Musalmáns had destroyed.* "

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* I have not referred in the text to the narrative of Ralph Fitch who visited Koch Bihár between 1563 and 1581, and states that the king then ruling was

Nara Narayana's submission to the Emperor.

Another incident not mentioned in the *Vaṁśávali* is that related in the following extract from the *Akbarnámah* :[*]—

"To the events of this time (1578 A. D.) belongs the arrival of the "*Peshkash* from Bengal and Koch Bihár. Raja Bál Gosaiñ (Nara "Náráyaṇa) who is Zamindár of Koch, submitted again, and sent valu"able presents from Bengal, with 54 elephants."

On the other hand, the Musalmán historians of the period make no mention of the assistance said to have been rendered by Nara Náráyaṇa in the subjugation of Dáúd Sháh.

The *Akbarnámah* tells us that when hostilities broke out between Lakshmí Náráyaṇa and the ruler of the eastern Koch kingdom, the former made his submission to the Emperor and met Rájá Mán Siṅgh at Anandapur. It is added that he gave his daughter in marriage to the latter, and not to the Emperor as stated in the *Vaṁśávali.*

In the *Túzuk i Jahángirí* it is stated that, in 1618 A. D., Lakshmí Náráyaṇa paid his respects personally at court in Gujráṭ and presented a *nazzar* of 500 mohars.

Invasion of Parikshit's Kingdom.

The invasion of Paríkshit's kingdom however, is attributed, not to the initiation of Lakshmí Náráyaṇa, but to a complaint made by Raghunátha, the Zamindár of Sosang, whose family Paríkshit had imprisoned.

The *Pádisháhnámah* contains a full account of the invasion which followed. The following abridgment is taken from the translation given by Blochmann in the J. A. S. B. for 1872 (pages 53–62). Mukarram Khán invaded Koch Hájo with 6,000 horse, 12,000 foot and 500 ships, and took Paríkshit's fort at Dhubrí, at which place he halted

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named Suckel Conse (S'ukl Koch or S'ukladhvaja), because the part of the kingdom which he visited was west of the S'ankosh (cf. Blochmann, J. A. S. B., page 240), and this part has never been claimed as having at any time belonged to S'ukladhvaja or his descendants. It is clear, therefore, that there must be some mistake, and as S'ukladhvaja was a far more prominent man than his elder brother, the real king, it is not unlikely that Ralph Fitch thought that he was the ruler *de jure* as well *de facto.* Or it may be, that Ralph Fitch's visit took place during the year for which, according to Guṇábhirám, Nara Nárayaṇa left his kingdom in charge of Sílarái and wandered about in disguise, in order to avoid the disaster which it was supposed would ensue from the influence of the planet Saturn, under which the astrologers asserted that he had had the misfortune to come. The story of his temporary abdication is not improbable, as the Gaṇaks have always exercised almost unlimited power over credulous converts to Hinduism, and we have an exact parallel in Ahom history in the case of the king S'iva Siṁha, who abdicated in 1720 A. D. in favour of his wife Phúleśvarí, in consequence of an adverse prediction by the astrologers attached to his court.

[*] Lucknow edition, III, page 207.

during the rains. Paríkshit was defeated in a naval engagement in the Gajádhar river and retreated, first to Khelah and afterwards to Budhnagar on the Manás, where he at last surrendered, and by the Emperor Jahángír's orders, was sent to Court. His brother Bali Náráyaṇa, or Baldeo, as he is called by the Musalmán historian, fled to the Ahom king.

Invasion of Upper Assam.

The Musalmáns proceeded, under Sayyad Ḥakím and Sayyad A'bá Baqr, to invade the country of the A'homs, but were destroyed in a night attack. A fuller account of this invasion is contained in the A'hom chronicles, where it is stated that the Musalmáns proceeded as far as Bishṇunáth. They were at first victorious and took many captives, but were subsequently defeated by the A'homs, who had called in the aid of the Kachárís of Kháspur. The cause of the invasion is said to have been the murder by the A'hom garrison, at Koliabar, of a Muhammadan trader who was suspected of being a spy. It is stated that A'bá Baqr (who is called Bábákar in the A'hom *Buranji*) and his son Ghiyáṣu'd-dín were slain in the battle, and that the body of the latter was taken back to Hájo and buried there.*

The *Pádisháhnámah* continues that Bali Náráyaṇa† then persuaded

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* Guṇábhirám says that this invasion is described in the *Guru Bhatima*, a collection of hymns written shortly after the time of the occurrence by S'aṅkar Deva and his disciple and successor, Mádhava. I have not been able to procure a complete collection of these hymns, but in a selection of them published by Haribilás Gupta, the only Musalmán invasion referred to (page 79) is one in which the ruler of Gauṛ is said to have been utterly defeated by Nara Náráyaṇa. In this account, the destruction of images is not mentioned, and it is possible that some other invasion is referred to.

† The A'homs called him Dharma Náráyaṇa. In A'hom histories it is said that Bali Narayaṇ or Raghu Deva (accounts differ) gave the daughter of the latter—Maṅgaldái by name—to Pratápa Siṁha in marriage. Maṅgaldái town and river are said to be named after this princess.

Ghiyáṣu'd-dín is said to have been a very pious and learned man, and the sanctity attaching to his tomb was consequently so great, that it became a very sacred place in the eyes of the Musalmáns, and was accordingly known as Powa Mekka. The origin of this name is differently accounted for by a writer in the *Calcutta Review* of 1867. He says that after the death of Ḥusain Shah's son, Dányál Sulṭán Ghiyásu'd-dín succeeded him, and brought a colony of Musalmáns to Háj and made large assignments of lands for religious purposes. He resolved to build a grand mosque at Hájo, and brought earth from Mekka to give additional sanctity to the place. He died however before completing the mosque, and was buried under the holy earth. It is not known from what source this writer derived his information, but it seems on the face of it more probable than the other story, as it is hard to believe that a vanquished army would carry a corpse so great a distance as from Bishṇunáth to Hajo. On the other hand, it is unlikely that Musalmáns rethe Áhoms to invade Hájo, and the latter agreed and sent him thither with an army. He retook Darrang, and reinforcing his army by some discontented Musalmán Jágírdárs of Hájo, seized also perganas Luki and Bháomanti, and finally attacked 'Abdu's-salám, the Musalmán Governor of the country.

Bali Narayana regains Darrang.

It is not stated how long these events took, but it would appear from other sources of information, that a considerable time must have elapsed between the retaking of Darrang and the attack on 'Abdu's-salám which led, as will be noted further on, to the defeat and death of Bali Náráyaṇa.

The defeat of Paríkshit is stated to have taken place in 1614 A. D. and the final overthrow of Bali Náráyaṇa in 1637. The Áhom chronicles place the defeat of Ábá Baḳr in 1549 Sak or 1627 A. D. and state that his army was pursued and the Áhom rule extended as far as Gauháṭí, and that Bali was set up as a tributary of the Áhoms in Darrang and Gaja Náráyaṇa, brother of the latter, at Beltolá. Subsequently, it is stated, Pratápa Siṁha became lord paramount of the Rájás of Rání, Luki, Mairápur, and other places. These events must have taken time to bring about, and it may therefore, I think, be assumed that Bali became ruler in Darrang at least, if not also in part of Kámrúp, immediately after Ábá Baqr's defeat in 1672, so that he ruled there for ten years before his final conflict with the Musalmáns.*

On being attacked by Bali, 'Abdu's-salám reported matters to Islám Khán, Governor of Bengal. Reinforcements were at once sent to him, but owing to the treachery of Sattrajit, the Thánádár of Páṇḍu, the dispositions of the Musalmáns were not as effective as they might otherwise have been. In several engagements in the neighbourhood of Páṇḍú, however, success remained with the Muhammadan army.

War between Bali Narayana and Abdu's-salam.

Subsequently, as 'Abdu's-salám was moving his fleet from S'righáṭ towards Hájo, he was attacked at night by the Áhom fleet which numbered 500 ships. Sattrajit took the first opportunity to retire with his fleet, and the Musalmáns were beaten. Bali Náráyaṇa followed up this success by laying siege to Hájo, and after cutting off his supplies, forced 'Abdu's-salám to treat. The latter went with his brother to the hostile camp, where he was at once seized and sent off to Gaṛhgáoñ.

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mained at Hájo after prince Dányál's defeat, as Víśva Siṁha was then rapidly rising to power. Besides, the *Fatḥiyah i 'Ibriyah* says that the whole of that prince's army was killed or captured. (J. A. S. B. 1872, page 79.)

* In Guṇábhirám's *Ásám Buranji* it is said that Bali Náráyaṇa fixed his capital at Maṅgalḍái in Darrang, and ruled well.

The Musalmáns then tried to force their way through the enemy, but were all cut up in the attempt.

In the meantime, Parikshit's son Chandra Náráyaṇa, who had established himself with 6,000 or 7,000 A'homs and Koches at Karaibáṛi, was attacked by the troops left at S'rígháṭ and forced to retreat to pargana Solmári. He was killed shortly afterwards. The Musalmáns then marched to Dhubrí where they found and arrested Sattrajit, who was subsequently executed for his treachery, and thence proceeded to Jogighopá, at which place as well as at Hirápur on the opposite bank of the Brahmaputra, Bali Náráyaṇa had erected strong fortifications, his fleet being anchored between the two forts. They were harassed on their way by the enemy's troops, but drove them off, and after several assaults, they forced Bali Náráyaṇa to retreat, and followed him across the Manás river. He retreated to Budhnagar where he threw up a strong entrenchment, but withdrew to Chothri on hearing that Muḥammad Ẓamán was marching against him with a strong detachment, under the guidance of Uttama Náráyaṇa, the son of Sardárbar, Zamíndár of Budhnagar, who was well acquainted with the country.

This detachment halted at Bishunpur for the rains, but was shortly afterwards attacked by Bali Náráyaṇa, who had received reinforcements which brought the strength of his army up to 40,000 men. He threw up fortifications at the Kalápáni river, about three miles from Bishunpur, behind which he encamped on a well-selected site, protected by rising ground, a river difficult to cross, and dense jungle. From this vantage ground he harassed the Musalmáns by repeated night attacks.

At the close of the rains, in spite of Bali Náráyaṇa's efforts to prevent it, a junction was effected between the detachment at Bishunpur and the main body of the Musalmán army, which had spent the rains at Chandankoṭ. Having united their forces they attacked and defeated Bali Náráyaṇa, who fled to Darrang. A son of the A'hom king was taken prisoner in this battle and was put to death together with all the other prisoners. The A'hom forts at Páṇḍu and S'rígháṭ were then taken together with 500 war sloops and 300 guns, and Koch Hájo again became a Musalmán province. Fort Kajlí (at the junction of the Kallang and the Brahmaputra) was also taken, and a detachment was sent to Darrang to hunt down Bali Náráyaṇa who fled to Siṅgirí, where he and his two sons shortly afterwards died. Gauháṭí was selected as the seat of Government of the Musalmán proconsul, and a financial settlement of the country was effected.

As already stated, the final overthrow of Bali Náráyaṇa is said to have taken place in 1637 A. D. Strange to say no mention of this struggle is made in any local history.

DATES OF THE KINGS MENTIONED IN THE VAṀŚÁVALI.

Rájá Lakshmí Náráyaṇa's *Vaṁśávali* mentions only one date—that of the erection of the Kámákhyá temple, and it is not very easy to fix the exact dates of the kings to whom it refers. Sone dates are given in the *Vaṁśávali* of Prasiddha Náráyaṇa, in Guṇábhirám's *Ásám Buranji*, in Buchanan Hamilton's account of Raṅgpur and elsewhere,* but these authorities often differ amongst themselves, and it is therefore necessary to examine the matter in some detail.

Dates of Raja Nara Narayana.

It will perhaps be easiest to arrive at the truth by dealing in the first instance with the dates of Rájá Nara Náráyaṇa. Three different dates are assigned for the time when he ascended the throne in succession to his father Viśva Siṁha, *viz.*, 1528 A. D. by Guṇábhirám, 1534 in Prasiddha Náráyaṇa's *Vaṁśávali*, and 1555 by Bábú Rám Chandra Ghosh.

His death is said to have occurred in 1584 A. D., and Prasiddha Náráyaṇa's *Vaṁśávali* and Guṇábhirám's *Ásám Buranji* agree in fixing 1581 as the date of Raghu's accession to power in the eastern part of the old Koch kingdom, while the inscription in the Hayagríva temple at Hájo, which was built during his reign and bears date 1583 A. D., helps to confirm this as the date of the division of the kingdom.

It is recorded in the *Akbarnámah* that Lakshmí Náráyaṇa who had then succeeded his father, made his submission to the Delhi Emperor and paid his respects to Raja Mán Siṅgh in 1596 A. D. On the other hand, the Musalmán historians refer to Nara Náráyaṇa as still reigning in 1578.† It is thus certain that Nara Náráyaṇa died between 1573 and 1596 A. D. and we may therefore, I think, confidently accept 1584 as the approximate date of his death.‡

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* I do not refer to the dates given in the manuscript copy of the Yoginí Tantra in the possession of a Bráhman of Haulí Mohanpur, as it appears that they are not trustworthy, so far as these earlier kings are concerned. Prior to the accession of Mahendra Náráyaṇa in 1660, only four dates are given, *viz.*, the erection of Hájo and Kámákhyá and the accessions of Viśva Siṅgh and Raghu Deva. The two former, which could always be ascertained from the inscriptions in the temples themselves are correct, but the two latter—1495 A. D. and 1555 A. D. are obviously wrong. It seems probable that the collection of dates in this volume was not commenced until long after the time of these two kings, and that when it was undertaken, their dates were filled in by guess work.

† Blochmann, J. A. S. B. 1872, page 53.

‡ Blochmann, J. A. S. B. 1875, page 306. The name of the ruler mentioned in the Musalmán account is Bál Gosaiñ, but this is clearly only another name for Nara Náráyaṇa. Blochmann says that Bál Gosaiñ was the son of Nara Náráyaṇa and father of Lakshmi Náráyaṇa, but this must be a mistake, as neither in the very full account contained in the *Vaṁśávali* nor in any other local narrative, is mention made of any

It is less easy to come to a definite conclusion regarding the date of his accession. According to the *Vaṁśávali* of Prasiddha Náráyaṇa, this took place in 1534; Guṇábhirám following Biśveśvar places it in 1528 and Bábú Rám Chandra Ghosh in 1555 A. D.* The last mentioned date may be at once rejected, on the testimony of a silver coin of this king which was found some years ago in the Gáro Hills and published in the J. A. S. B. for 1875, page 306.† This coin is dated 1477 S'ak (1555 A. D.), or the very year fixed for Nara Náráyaṇa's accession by Bábú Rám Chandra, and as he had to fight with his brother Nara Siṁha before obtaining the throne, it is extremely unlikely that he began to issue coins in the very first year of his reign. It is much more likely that the time when this money was coined, formed the second period in his reign, namely, the interval of peace which followed his earlier expeditions and preceded the second war against the ruler of Gauṛ.

Perhaps the best way of arriving at the probable date of his succession will be to calculate it from several independent data, and then to strike an average. The *Akbarnámah* says that his son was born when he was fifty years of age. As the latter ascended the throne on his father's death without, it would appear, the help of guardians, he cannot at that time have been less than 15 years of age. On this calculation Nara Náráyaṇa must have been born in 1519 A. D., and as he was still a student when his father died, he cannot at that time have been much more than 15 years of age. This would bring his accession to 1534 A. D., which is the very date mentioned in Prasiddha Náráyaṇa's *Vaṁśávali.*

Another way of arriving at the probable date of his succession is by calculating what time would be required for the different events referred to in the history of his reign, which occurred prior to the erection of Kámákhyá temple, the date of which (1565 A. D.) is known to us by the inscription in the temple itself and by the concurrent testimony of Prasiddha Náráyaṇa's *Vaṁśávali*, and the manuscript edition

ruler between Nara Náráyaṇa and Lakshmí, and all alike agree in saying that the latter was the son of the former. Besides Blochmann says that the brother of Bál Gosaiñ was S'ukl Gosaiñ, who can be none other than S'ukladhvaja. In his notice of the *Akbarnámah* (J. A. S. B. 1872, page 52) he quotes a passage which says that Bál Gosaiñ lived the life of an ascetic and did not marry until he was 50 years old, when he took a wife by whom he had a son named Lakshmí Náráyaṇa. Lastly, on page 100 of the number of the *Journal* just quoted, Blochmann himself, in a footnote, explains that Nara Náráyaṇa is called Bál Gosaiñ in the *Akbarnámah*.

* Statistical Account of Koch Bihár, page 407.

† A similar coin of Nara Náráyaṇa bearing the same date had been previously published in J. A. S. B. 1856, page 547, by Rajendralála Mitra.

of the Yogini Tantra in the possession of the Bráhman of Hauli Mohanpur.

Briefly these events are:—

(1.) Expulsion and pursuit of Nara Siṁha.
(2.) Construction of Gosaiñ Kamala Áli. This is said to have taken a year to make, but the real time it took was probably considerably longer.
(3.) Invasion of the Áhom kingdom. The Áhom chronicles mention at least two expeditions, and the *Vaṁśávali* relates that Nara Náráyaṇa remained a year at Gaṛhgáoñ before the Áhom king submitted.
(4.) Conquest of Hiṛamba or Cachar.
(5.) War with the king of Jaintiá.
(6.) War with the king of Tipperah.
(7.) War with the king of Dimaruá.
(8.) War with the king of Sylhet.
(9.) War with the ruler of Gauṛ.
(10.) Śilarái's detention at Gauṛ.
(11.) Erection of Kámákhyá. According to the *Vaṁśávali* this was carried out in six months, but other accounts say that the temple took ten years to build.

It is difficult to arrive at any exact conclusion as to the time which these events occupied, but bearing in mind the difficulties of locomotion at that time, and the fact that between each war it would probably be necessary for the Rájá to spend some time attending to the internal affairs of his kingdom and consolidating his rule, I do not think it would be safe to allow a smaller period than 30 years for these occurrences. Deducting this period from the date of the erection of Kámákhyá, we get 1535 A. D., as the date of his accession, which is again very nearly the date quoted in Prasiddha Náráyáṇa's *Vaṁśávali*. On the other hand, the Áhom chronicles fix 1562 as the date of his invasion of their country, and as this is one of the earliest events of his reign as recorded in the *Purushanámah*, it would seem that his reign could not have commenced long before that date. As, however, it is certain that Kámákhyá was rebuilt in 1565, and all the intervening events could not possibly have occurred within the short space of three years, it is clear either that this date is incorrect or else that the *Váṁśávali* does not record events in their historical sequence. On the whole the weight of the evidence seems to show that Nara Náráyaṇa came to the throne in 1534 A. D., or soon afterwards.

Visva Simha's dates.

The same dates, of course, represent the conclusion of Viśva Siṁha's reign. As regards its commencement, it will be remembered that Nilámbara was overthrown by Ḥusain Sháh in 1498 A. D., and that afterwards Chandana and Madana reigned for a few years at Marálávása, a place some 20 miles north of Kamaṭhapura. If, therefore, Chandana and Madana ruled the whole of the country formerly under the sway of the Khyen Rájás, it would be impossible for Viśva Siṁha to have begun to rule before 1515–1520 A. D. It has, however, already been shown that after the fall of Nilámbar, there was no ruler of the whole kingdom, but that many petty chiefs exercised supreme power in different parts of the country. This being so, there is no reason why Viśva Siṁha should not have begun to rule some portion of the country while Chandana and Madana still held sway at Marálávása. Buchanan Hamilton says that "the Bihár Rájás reckon by the era of their ancestor, Viśva, whom they suppose began to govern in the Bengal year 916 or 1509 A. D.," and as this, on the date arrived at for Nara Náráyaṇa's accession, would give him a reign of 25 years, there seems to be no reason for discrediting the date thus assigned for Viśva Siṁha's accession. We have seen that this prince gradually rose from the position of one of many petty chiefs to be ruler of the whole country from Rangpur to Kámarúpa, and that he eventually found himself strong enough to march against the Áhom king in Upper Assam. It is very unlikely he could have effected all this in a shorter time than that allowed him according to the above calculation. Finally Lakshmí Náráyaṇa's *Vaṁśávali* mentions 25 years as the duration of his reign, and this is exactly the period intervening between 1509, the date of his accession according to the Koch era, and 1534, the date of his death according to Prasiddha Náráyaṇa's *Vaṁśávali*.

Raghu Deva's dates.

Turning now to the kings who succeeded Nara Náráyaṇa, it has already been shown that Raghu Deva probably became king of the country east of the Sankosh in 1581 A. D. Guṇábhirám and Prasiddha Náráyaṇa's *Vaṁśávali* agree in saying that his death took place in 1593 A. D., and we know from the *Pádisháhnámah* that Paríkshit was ruling when Jahángír came to the throne in 1605. We may, therefore, accept 1593 as the approximate date of Raghu's death.

Paríkshit's dates.

According to Guṇábhirám, Paríkshit died in 1606 A. D. at Patna. The *Pádisháhnámah*, however, places his defeat by Mukarram Khán in 1613-14, so that according to this account, his death must have taken place about 1614 or 1615 A. D.

Bali Narayana's dates.

Bali Náráyaṇa, who succeeded Paríkshit, is said by Guṇábhirám to have died in 1634 A. D.,* but it appears from the account given in the *Pádisháhnámah* that this is too early. According to this authority his death took place in 1637.

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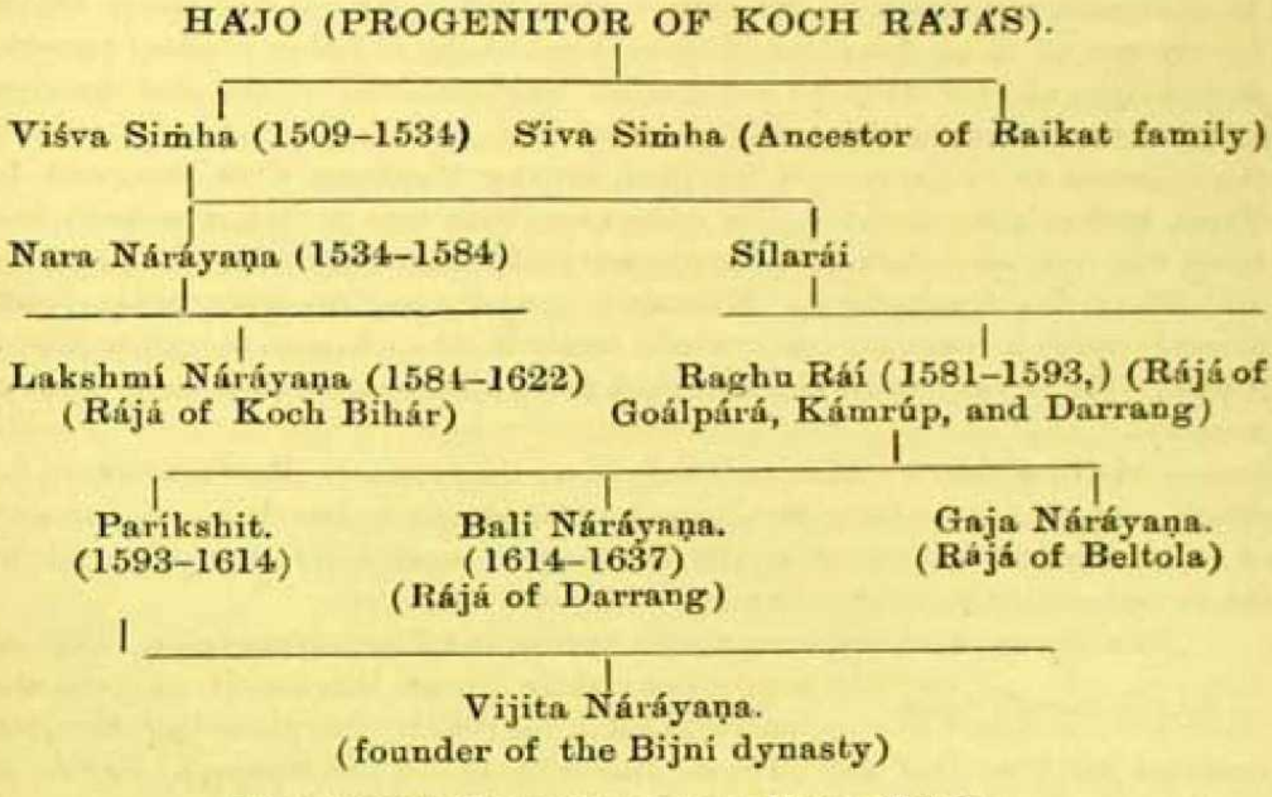
* The same date is given in Prasiddha Náráyaṇa's *Vaṁśávali*.

Lakshmi Narayana's dates.

Regarding Lakshmí Náráyaṇa, who succeeded his father in the western portion of the Koch kingdom in 1584 A. D., we know from Musalmán sources that he was still reigning in 1618. Babu Rám Chandra Ghosh says that he died in 1622 A. D.

Summary.

The dates of these earlier Koch Kings appear therefore, to be approximately those shown in the following genealogical tree.


HÁJO (PROGENITOR OF KOCH RÁJÁS).
Viśva Siṁha (1509–1534)
S'iva Siṁha (Ancestor of Raikat family)
Nara Náráyaṇa (1534–1584)
Sílarái
Lakshmí Náráyaṇa (1584–1622) (Rájá of Koch Bihár)
Raghu Rái (1581–1593,) (Rájá of Goálpárá, Kámrúp, and Darrang)
Parikshit. (1593–1614)
Bali Náráyaṇa. (1614–1637) (Rájá of Darrang)
Gaja Náráyaṇa. (Rájá of Beltola)
Vijita Náráyaṇa. (founder of the Bijni dynasty)

SUBSEQUENT HISTORY OF THE KOCH RÁJÁS.

Koch Bihar family.

The subsequent history of the descendants of Lakshmí Náráyaṇa will be found in Hunter's Statistical Account of Koch Bihár, pages 409–426, and the only additional information of any importance of which I am aware, is that contained in the extracts from the *Fatḥiyah i 'Ibriyah* which were published by Blochmann in the J. A. S. B. for 1872, pages 63–68. From these extracts it appears that in 1558 A. D., during the wars for the succession to the Delhi throne, Rájá Bhíma Náráyaṇa took advantage of the disturbed state of the country to make raids into Ghoṛaghâṭ and attempted to recover Kámarúpa. In the latter endeavour he was thwarted by Jayadhvaja Siṁha, the Áhom king, who had also sent an army into Kámarúpa. When Mír Jumla became governor of Bengal, he at once took steps to punish Bhíma Náráyaṇa and Jayadhvaja Siṁha and to recover the lost territory. He began by invading Koch Bihár. Bhíma Náráyaṇa, asked for pardon, but Mír Jumla refused to accept his excuses, and in November 1661, he started from Jahángírnagar with his army. Bhíma Náráyaṇa had fortified the road *via* the Yak Duár, and also the Khuṇṭagháṭ road, which passed by Ráṅgámáṭi, but had neglected to protect a third which ran through the Moraṅg country. By this road, therefore, Mír Jumla advanced. The Rájá fled to the Bhotán hills, and the greater part of his baggage and guns and other munitions of war was captured by Mír Jumla's army. The latter sent to the Dharma Rájá of Bhotán, requesting him to deliver up Bhíma Náráyaṇa, but this the Deva Rájá refused to do. Being pressed for time, Mír Jumla did not stay to enforce his request, but proceeded to carry out his projected invasion of Assam.

The Koch King is described in the *Fatḥiyah i 'Ibriyah* as being noble and mighty and fond of company. He was a great wine-bibber, and was so addicted to the pleasures of his harem, that he neglected to look after his kingdom. He had a magnificent palace. There were flower beds in the streets, which were lined on each side with rows of trees. The weapons of the people were swords, firelocks and poisoned arrows.

This invasion by Mír Jumla is not mentioned in the account given by Hunter. Moreover, the name of the king at the time in question is said by him to be Práṇa Náráyaṇa who came to the throne in 1627 and died in 1666 A. D.

The omission to refer to the invasion may be explained by the fact that it left no permanent effect. Mír Jumla advanced, and the king retreated without giving battle, and apparently returned again to his capital as soon as Mír Jumla vacated it. The discrepancy in the matter of names is also of very little importance. The character of the king as pourtrayed by Hunter agrees closely with that given in the *Fatḥiya i 'Ibriyah*; we know that Viśva Siṁha, Nara Náráyaṇa, S'ilarái and others of the family bore each two different names, and there is thus no reason why Praṇa Náráyaṇa should not also have been known as Bhíma Náráyaṇa.

Bijni Family.

After Paríkshit's defeat, his son Vijita Náráyaṇa was confirmed by the Musalmáns as Zamíndár of the country between the Manás and the Sankosh. He settled at Bijní and is the ancestor of the existing Bijni family. Under the auspices of this family, a small pamphlet was issued, some years ago, giving an account of Vijita's successors, but as they were not independent princes, there would be little use in dwelling on their history. It may, however, be interesting to note the present status of the family and the manner in which it was created.* Under Mughal rule, the Rájá paid an annual tribute of Rs. 5,998, which was afterwards commuted to an annual delivery of 68 elephants, The Náẕim used to make up for short deliveries by sending a *Sazáwal* into the Rájá's estates and levying the balance due by force, but when the East India Company came into possession of Bengal, this method of recovering outstanding payments was abandoned, and during the years 1776–1787 A. D., only 90 elephants were received out of the 816 which should have been supplied. The contribution of elephants was again changed for a money payment in 1788, the amount fixed being Rs. 2,000. Two years later the Rájá agreed to pay another thousand rupees a year, but this offer was declined by the Governor-General, on the ground that the chance of losing the attachment of a Zamíndár in possession of a border estate should not be risked for the sake of Rs. 1,000. Subsequently a deduction of Rs. 850 from his annual payment was allowed as compensation for the abolition of *sáyar*, so that the family now pay a total revenue of only Rs. 1,150, for an estate, the annual collections from which amount to very nearly two lakhs of rupees.†

Darrang family.

In Darrang, Bali Náráyaṇa was succeeded by Mahendra Náráyaṇa, who is said to have made large grants of *Brahmottar* land to Bráhmaṇs. He died in 1643 A. D., and was succeeded by his son Chandra Náráyaṇa, who died in 1660, and was followed by his son Súryá Náráyaṇa. This prince is said to have been worsted in battle by Manẕúr Khán in 1682, and taken captive to Delhi.‡ He escaped, but declined to resume his place as

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* This information is extracted from a note by Mr. Forbes in 1875, on certain bundles of paper received from the Board of Revenue.

† It has been argued that the estate has never been permanently settled, that the payment is of the nature of a tribute and not an assessment, and that as Bijní is no longer a border estate, the reason for an unduly low assessment no longer exists. But this is a matter with which we are not at present concerned.

‡ According to Gunabhirám. Prasiddha Náráyaṇa's *Vaṁśávali* says, that Mansúm Khán was the name of the Musalmán leader, and fixes 1675 as the date of the occurrence. The manuscript Yoginí Tantra on the other hand, says that it took place in 1709 A. D. No mention is made of the matter by Musalmán historians, and even the name of the Muhammadan leader does not appear in their accounts of events in Kámrúp. I have not mentioned Mír Jumla's invasion, which took place during this prince's reign, as that invasion was directed against the Áhoms, and there is no record of any conflict between Súrya Náráyaṇa and the Musalmáns. The only reference to this king in the *Fáthiyah i 'Ibriyah* is the following:—"At this time Makar dhvaj, Rájá of Darrang, who is subject to the Rájá of Assam, came and paid his respects to the Nawáb (at Gauháṭi), presented an elephant, received a *Khil'at*, was promised protection, and was ordered to travel with the army."

Rájá.[*] He was succeeded by his brother Indra Náráyaṇa, who was at that time only five years old. During his minority, the A'homs took advantage of dissensions amongst his councillors to strengthen their hold on the country. Darraṅg alone remained in his possession, and even for this he had to pay an annual tribute. During his reign, Darraṅg is said to have been surveyed under the orders of the A'hom Rájá, presumably with the object of ascertaining the amount of tribute which Indra Náráyaṇa would be able to pay.[†] When his son A'ditya Náráyaṇa succeeded him in 1725, the kingdom consisted only of that portion of the present sub-division of Maṅgaldái, which lies south of the Gosaiñ Kamala A'li, and three years later, the greater part of this small vestige of the heritage of his ancestors was wrested from him by his younger brother, Madhu Náráyaṇa, who took also one of the two family idols.[‡] From this time, the family sank into comparative insignificance. They were now mere subordinates of the A'homs, and exercised no powers except such as were conferred on them by the A'hom prince.

Later on, their position was still further reduced, and instead of being tributaries, they were simply agents for the A'hom King, and in return for managing Deś Darraṅg were allowed the lands which were cultivated by their personal slaves and servants, which were surveyed, and carefully recorded in the state records of the A'homs.[§] When the English came into possession of the country they were allowed to retain these lands subject to the payment of half the usual revenue on the area under cultivation, so long as they themselves remained in possession. On alienation of any of these lands, however, the privilege of paying at half rates is withdrawn, and an assessment at full rates introduced. The existing representatives of the family still hold most of the land originally granted to them, but owing to their bad management and extravagant habits, they are now reduced to a condition of comparative poverty.

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[*] In Prasiddha Náráyaṇa's *Vaṁśávali*, it is said that he was detained in Bengal for 50 years and only returned to Assam in 1725 A. D., where he died ten years afterwards.

[†] According to the manuscript Yoginí Tantra this survey took place in 1707 A. D., and was carried out by one Dhanirám.

[‡] These are the Durgá or Burí Gosainí and S'iva or Burá Gosaiñ. The gold ornaments of these two idols were stolen within a few months of each other, some seven years ago.

[§] Report on the Darrang district by Captain Mathie, Principal Assistant, dated 15th February, 1835.

Bíjapur Inscription of Dhavala of Hastikuṇḍí of the Vikrama year 1053. (*From the materials supplied by Munshí Devíprasád*).—*By* PROFESSOR F. KIELHORN, C. I. E., GÖTTINGEN.

This inscription was discovered, more than fifty years ago, by Captain Burt, from whose rubbing fragments of the text and what professes to be a literal translation were published in Vol. X. pp. 819-821 of the Society's *Journal.* The account, there given of its contents, is however quite worthless, and it is therefore fortunate that this document has lately been again brought to public notice by Munshi DEVÍPRASÁD of Jodhpur, a gentleman who takes great interest in the history and antiquities of his country. Munshí Devíprasád, in 1891, furnished the Society with an account of it which will be found in the *Proceedings* for 1892, pp. 2-3; and he has more recently sent in a fuller paper on the same subject, as well as an ink-rubbing of the inscription. These materials have been forwarded to me by the Philological Secretary, with the request that I should publish the text of the inscription. Although the rubbing sent to me does not enable me to do this as it ought to be done, I have great pleasure in giving here, after revision, the substance of Munshí Devíprasád's notes, together with some extracts from the Sanskrit text; and I trust that by doing so I may induce those who have access to the original inscription to furnish either myself or some other scholar with carefully made impressions of it.

According to local report the stone which bears this inscription was originally fixed* near the entrance of a solitary Jaina temple which stands about two miles south of the village of BÍJAPUR in the Bali-Godwár District of Márwár, among or close to the remains of the old town of HATOṆḌÍ, the HASTIKUṆḌÍ or HASTIKUṆḌIKÁ of this inscription. From there it is said to have been removed, some years ago, to the Dharmśálá of the Jaina community of Bijapur, where it was seen in 1889 by Mr. Joshi Aidán, Inspector of the Historical Department of Márwár. That officer brought it to the notice of Munshí Devíprasád, and it is now probably at Jodhpur, having been made over to the charge of the Historical Department of Márwár.

The inscription contains 32 lines of writing which cover a space of about 2′8½″ broad by 1′4″ high. Near the proper right margin, all the way down, the writing has suffered a good deal, apparently from exposure to the weather; but otherwise the inscription is in a very fair state of preservation, and I have no doubt that, with a good impression, nearly the whole of the text may be made out with certainty. The size of the letters is about $\frac{3}{8}''$. The characters are Nágarí; they closely resemble, but look more modern than those of the Harsha inscription* of Vigraharája of the Vikrama year 1030. The language is Sanskrit, and nearly the whole is in verse. Throughout, the inscription has been written and engraved with great care, and in respect of orthography it need only be stated that the letter *b* has generally (not always) been denoted by the sign for *v*, and that the dental and palatal sibilants have sometimes been confounded.

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* Captain Burt found the inscription "in the interior of a gateway leading to Mandir, distant one kos from Beejapoor, on the route from Odeypore to Sirohee near Mount Aboo." See this *Journal*, Vol. X. p. 821.

The inscription divides itself into two parts. The first part is a *Praśasti* of 41 verses which was composed by SÚRYÁCHÁRYA (line 21), and which is dated (in lines 19 and 22) in the year 1053, on the 13th of the bright half of Mágha, a Sunday, under the *nakshatra* Pushya,—corresponding, for the expired Vikrama year 1053, to Sunday the 24th January A. D. 997, when the 13th *tithi* of the bright half ended 7 h. 5 m., and when the moon was in the *nakshatra* Pushya up to 21 h. 40 m. after mean sunrise. The proper object of this *Praśasti* is, to record the consecration by the Jaina sage ŚÁNTIBHADRA or ŚÁNTYÁCHÁRYA, who during the reign of a certain DHAVALA lived at that prince's capital HASTIKUṆḌÍ or HASTIKUṆḌIKÁ of an image of the Tírthaṁkára Ṛishabhanáthadeva, at a temple that had been founded at Hastikuṇḍí by Dhavala's grandfather VIDAGDHA. But, as is usual in such cases, what is more valuable to us is the genealogy of the prince Dhavala which is given by way of introduction in lines 2–6, and which contains some interesting references to princes who (with perhaps one exception) are known to us from other inscriptions. This genealogical part of the *Praśasti* will be considered below.

The second part of the inscription, from line 23 to 32, is really quite an independent inscription, added on to the preceding *Praśasti* because it records endowments that were made in favour of the same Jaina temple, or of a sage connected with it, by the father and grandfather of the prince Dhavala, mentioned above. This second inscription also (in line 23) opens with some verses on the genealogy of the rulers of HASTIKUṆḌÍ. First there was a prince HARIVARMAN. From him sprang the prince VIDAGDHA who was 'a tree yielding every desire in the garden which was the illustrious RÁSHṬRAKÚṬA race.' And his son again was the illustrious MAṀMAṬA. The inscription then records that, in the Vikrama year 973, VIDAGDHA made some donations in favour of a sage named BALABHADRA, and that these gifts were largely added to by the prince MAṀMAṬA in the Vikrama year 996.

From the second inscription we learn, then, that the chiefs of

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* See *Epigraphia Indica*, Vol. II. p. 120, plate.

Hastikuṇḍí here eulogized, belonged to the Ráshṭrakúṭa family, and that Vidagdha, the son of Harivarman, was ruling in Vikrama-saṁvat 973, and his son Maṁmaṭa in Vikrama-saṁvat 996. According to the first inscription, which in verses 4–8 mentions the same princes, Maṁmaṭa was succeeded by his son Dhavala who was alive in Vikrama-samvat 1053, but had then made over the government to his son Bálaprasáda. Of Harivarman, Vidagdha and Maṁmaṭa the first inscription says nothing of importance. Of Dhavala, whose reign fell in the first half of the 11th century of the Vikrama era, verses 10–12 record certain dealings which he had with the princes Muñjarája, Durlabharája, Múlarája and Dharaṇívaráha, though, what these dealings were, is owing to the damaged state of the inscription, not in every case quite clear. From the first half of verse 10 it appears that Muñjarája, who must be taken to be Vákpati-Muñja of Málava for whom we have dates of the Vikrama years 1031, 1036 and 1050, invaded Medapáṭa (or Mewáḍ), and the second half of the verse probably stated that the ruler of that country on that occasion was either supported or sheltered by Dhavala. Similarly verse 11 seems to record that Dhavala assisted a prince, whose name may have been Mahendra or Mahíndra, against a prince Durlabharája, who probably was the brother of the Cháhamána Vigraharája of the Harsha inscription. And verse 12, again, states that Dhavala also supported Dharaṇívaráha, when that prince was atttacked by Múlarája. That this last-mentioned prince was the Chaulukya Múlarája I., whose latest known inscription is dated in Vikrama-saṁvat 1051, is clear; his opponent Dharaṇívaráha might perhaps be conjectured to have been one of the Chúḍásamá chiefs,* but, before trying to identify him, it will be better to wait till his name is found in other records.

EXTRACTS FROM THE TEXT.

L. 2. · · · · · · · · महीभृतां ॥ ३ [॥*]

अभिवि(बि)भ्रद्रुचिं कांतां सावित्रीं चतुराननः ।
हरिवर्म्मा व(ब)भूवात्र भुविभुर्भुवनाधिकः ॥ [४ ॥*]
सकललोकविलोक(च)नपंकजस्फुरदनंबुदवा(बा)लदिवाकरः ।
रिपुवधूवदनेंदुहृतद्युतिः

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* See *Indian Antiquary*, Vol. XII. p. 192.

3. [समुद ?] पादि विदग्धनृप[स्तत: ॥ ?] [५ ॥×]

— — — — ⏑ ⏑ ⏑ ⏑ ⏑ — — ⏑ — — ⏑ — —
— — नीतो दि ⏑ ⏑ ⏑ [क]रैर्न्नीरजन्माकरो वा [।×]
पूर्व्वं जैनं नि[ज]मिव यशो — ⏑ — हस्तिकुंड्यां
रम्यं हर्म्म्यं गुरु हिमगिरेः शृंगशृंगारहारि ॥ ६ [॥×]
दानेन तुलितव(ब)लिना तुलादिदानस्य येन [देवा]य ।
भाग[द्व]यं व्यतीर्यंत भागश्च

4. · · · · · र्याय ॥ [७ ॥×]

तस्माद · · · · · मंमटा · ⏑ — ⏑ — ।
· · · · · · श्लाघ्यं · · · · ⏑ — ⏑ — ॥ ८ [॥×]
तस्मादसमः समजनि स[मस्तजनि]जनितलोचनानं[द]ः ।
धवलो वसुधाव्यापी चंद्रादिव चंद्रिकानिकरः ॥ [९ ॥×]
भंक्काघाटं घटाभिः प्रकटमिव मदं मेदपाटे भटा[नां]
जन्ये राजन्य-

5. [ज ?]न्ये जनयति जन[ता]—रणां मुंजराजे ।

श्री— — — ⏑ [णार्थं] हरिण इव भिया — ⏑ — — ⏑ — —
— — — —शरण्यो ⏑ ⏑ ⏑ ⏑ ⏑ ⏑— यः सुराणां व(ब)भूव ॥ [१०॥×]
श्रीमद्दुर्ल्लभराजभूभुजि भुजैर्भुंजत्यभंगां भुवं
दंडैर्मंद्गुनसौ(शौ)ग्दचंडसुभटैस्तस्याभिभूतं विभुः ।
यो दैत्यैरिव तारका-

6. [प्र]भृतिभिः श्री[मन्महेंद्रं ?] [पुरा]

सेनानी[रिव] नीतिपौरुषपरोनैषीत्परां निर्वृतिं ॥[११ ॥×]
[यं ?] मूलादुद[मू]लय[द्गु]रु ⏑ — : श्रीमूलराजो नृपो
दर्प्पांधो धरणीवराहनृपतिं यद्वदि(द्वि)पः पादपं ।
आयातं भुवि कांदिशीकमभिको यस्तं शरण्यो द[धौ]
दंष्ट्रायामिव रूढमूढमहिमा कोलो महीमंडलं ॥ १२ [॥×]

10. [सु]नयतनयं राज्ये वा[ल]प्रसादमतिष्ठिप-
त्परिणतवया निःसंगो यो व(ब)भूव सुधीः स्वयं ।
कृतयुगकृतं कृत्वा कृत्यं कृतात्मचमत्कृती-
रकृत सुकृती नो कालुष्यं करोति कलिः सतां ॥ [१२ ॥×]

11. राजधानी भुवो भर्त्तुस्तस्यास्ते हस्तिकुंडिका ।
अलका धनदस्येव धनाढ्यजनसेविता ॥ [२२ ॥×]

14. अस्यां सूरिः सुराणां गुरुरिव गुरुभिर्गौरवार्हो गुणौघै-
र्भूपालानां त्रिलोकीवलयविल-
15. [सिता?]नंतरानंतकीर्त्तिः ।
नाम्ना श्रीशांतिभद्रो[भव]दभिभवि[तुं] भासमाना[स]माना-
कामं कामं ⏑ — — जनितजन ⏑ — संपदा [य]स्य मूर्त्तिः ॥ [२९ ॥×]

19. शांत्याचार्यैस्त्रिपंचाशसहस्रे शरदामियं ।
माघशुक्लत्रयोदश्यां सुप्रतिष्ठैः प्रतिष्ठिता ॥३८ [॥×]

22. संवत् १०५३ माघशुक्ल १३ रविदिने पुष्यनक्षत्रे श्रीरिषभनाथदेवस्य*
प्रतिष्ठा कृता महाध्वजश्चारोपितः ॥

23. आसीद्धीधनसंमतः शुभगुणो भास्वत्प्रतापोज्व(ज्ज्व)लो
विस्पष्टप्रतिभः प्रभावकलितो भूपोत्तमांगार्च्चितः ।
योषि[त्यौ ?]-
24. ⏑ ⏑ — ⏑ — ⏑ ⏑ ⏑ - भिर्व्वंगसंलालितो
यः श्रीमान्हरिवर्म्म† [उ]त्तममणिः सद्ब्रह्महारे गुरौ ॥

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* Read ऋषभ°.

† I believe that this is the actual (though incorrect) reading.

तस्माद्व(द्ब)भूव भुवि भूरिगुणो ⏑ — —
भूपप्रभूतमुकुटार्च्चितपादपीठः ।
श्रीराष्ट्रकूटकुलकाननकल्पवृक्षः
श्रीमान्विदग्धनृपतिः प्रकटप्रतापः ॥
तस्मा[द्ब] ⏑
25. ⏑ — ⏑ – ⏑ ⏑ ⏑ — — तः परं भाजनं
संभूतः शु(सु)तनुः सुतोतिमतिमान्* श्रीमंमटो विश्रुतः ।
येनास्मिन्निजराजवंशगगने चंद्रायितं [चारुणा]
तेनेदं पितृशासनं समधिकं कृत्वा पुनः पाल्यते ॥
श्रीवलभद्राचार्यं विदग्धनृपपूजितं समभ्यर्च्यं ।
आचंद्रार्कं यावद्दत्तं भवते म · · · [॥]

30. रामगिरिनंदकलिते विक्रमकाले गते तु शुचिमा[सि ।]
31. [श्रीम]द्व(द्ब)लभद्रगुरोर्व्विदग्धराजेन दत्तमिदं ॥
नवसु शतेषु गतेषु तु षण्णवतीसमधिकेषु माघस्य ।
कृष्णैकादश्यामिह समर्पि[तं मं]मटनृपेन(ण) ॥
32. इदं चाक्षयधर्म्मसाधनं शासनं श्रीविदग्ध[नृप?]दत्तं संवत् ९७३
श्रीमंमटरा[ज] · · · · संवत् ९९६ ॥ · · · ·

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* Read ॰मान्छ्री॰.

The Site of Karṇa Suvarṇa.—*By* H. Beveridge, B. C. S. (Retired).

Hiuen Tsiang, the Buddhist pilgrim, visited a town in Bengal which is spelt in Chinese, Kie-la-na-su-fa-la-na. M. Stanislaus Julien transliterates* this into the Sanscrit words *Karṇa Suvarṇa*, which may mean Karṇa the Golden, or Golden Ear, or simply, wearing gold earrings.† So far as I am aware, the site has not yet been satisfactorily identified, although it has been conjectured, chiefly from the similarity of name, that it lay on the Suvarṇa Rekhá, or Streak of Gold, a river which traverses Midnapur, and used to be the boundary between Bengal and Orissa. Some have placed it in Bírbhúm, and some in Singhbhúm; and quite recently Dr. Waddell,‡ has suggested that it lay close to Burdwan and is the place now known as Kañchannagar. My chief object in this paper is to show that Karṇa Suvarṇa is probably identical with Raṅgamáṭí, in the Murshidábád district, and situated on the right bank of the Bhágírathí, about six miles below Berhampur. But before I discuss this point, I am obliged to say a few words about the records of Hiuen Tsiang's travels.

It is well known that we have two accounts of his journeying. One is called the Si-yu-ki, or Descriptions of Western Countries, the other is his biography by Hwui-li and Yen-Tsung. The Si-yu-ki is in twelve books, and is regarded as the original and more authoritative account. It was not, however, entirely drawn up by Hiuen Tsiang. He gave the materials, but the composition is by one Pien-ki. M. Julien conjectures that Hiuen Tsiang's absence from China for seventeen years had made it difficult for him to write his mother tongue with the elegance required by Chinese officialism, and so the task was assigned to another monk. The biography is in ten books, and is mainly the work of Hwui-li. Both he and his continuator were contemporaries of Hiuen Tsiang, and as M. Julien remarks, their work is the livelier and more interesting of the two. It is also, I understand, written with greater elegance. That it is more interesting can easily be understood, for it is a biography and a record of Hiuen Tsiang's adventures; whereas the Si-yu-ki is a sort of *gazetteer* or treatise on geography. It is necessary to give these details because there is a remarkable discrepancy between the two records about the route by which Hiuen Tsiang reached Karṇa Suvarṇa, and it is desirable to decide which account should have the preference.

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* III. 84. Beal's translation, II, 201.

† II. 248n. At 250 l. c. the Chinese translation Kin-eul is used.

‡ See note at end of this paper.

The following two tables of routes show where the discrepancy lies :—

Places.	Direction and distance, in miles.	Remarks.
Route according to the Si-yu-ki.		I have reckoned the *li* as one-fifth of a mile, though it is a little more. Champá is Bhágalpur. Kajúghíra, or Kajiṅgara, has not been identified. Lassen points out that according to the biography, (I. 237,*) it lay partly at least, N. of the Ganges, though according to both the routes it lay on the W. bank. It is perhaps the Kajuráhí, or Kharjura-bhága (Sachau I. 202), of Albirúní, which he puts as 30 *farsákh* east of Kanauj. Sir A. Cunningham suggests Kánkjol, but the resemblance is only in position. M. Saint Martin suggests the Cudjiry or Kajirí in Rennel's map (No. 15 of Atlas), near Farukhábád, and opposite Gaur. The first part of the word may be connected with *khajur*, a date tree. In going to Pauṇḍra Vardhana, Hiuen Tsiang crossed the Ganges from west to east. In all probability Mr. Westmacott's suggestion that the place is Paṇḍuá, in Maldah, is correct. There is a river in this neighbourhood, and also according to Rennel, a town, called Púrṇabhaba, which sounds like Pauṇḍra Vardhana. On his way to Kámrúp, Hiuen Tsiang crossed a great river. This should be the Brahmaputra, but it is curious that he does not name it. The mention of Náráyaṇ as the ancestor of the royal family, seems to indicate that the place visited was Koch Bihár and not Assam proper. Samataṭa (level shore) is the Ganges delta. The two routes agree as far as Pauṇḍra Vardhana. The direct distance from Pauṇḍra to Raṅgamáṭí is about 75 miles. The direction is nearly due south, but if, as seems probable, Hiuen Tsiang started from the monastery of Váchpa (? Vásibhá) (I. 180 and III. 75)† 24 *li* to the west, then the direction of Raṅgamáṭí would be S. S. E. The delta is E. S. E. from Raṅgamáṭí, and the direct distance about 180 miles The direct distance from the seaface of the delta to Tamluk is about the same. The capital of Samataṭa is not known, but if Saśáṅka was a descendant of Ádiśúr, it might be Dacca or Sonárgáoñ. Samataṭa extended to the sea shore, but as it was bounded on N. E. by Sylhet (I. 182 and III. 82), it must have extended inland as far as Dacca.
Champá ...	......	
Kajúghíra ...	E. 80 ...	
Pauṇḍra Vardhana	E. 120 ...	
Kámrúp ...	E. 180 ...	
Samataṭa ...	S. 260 ...	
Tamluk ...	W. 180 ..	
Karṇa Suvarṇa ...	N. W. 140 ...	
Orissa ...	S. W. 140 ..	
Route according to the Biography.		
Pauṇḍra Vardhana	......	
Karṇa Suvarṇa ...	S. E. 140 ...	
Samataṭa ...	S. E. Not given	
Tamluk ...	W. 183 ...	
Orissa ...	S. W. Not given	

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* Beal's translation, p. 131.

† Beal's Si-yu-ki, II, 195 ; Life, 131.

It will be seen that the Si-yu-ki makes Hiuen Tsiang diverge into Kámrúp (Assam) and arrive at Karṇa Suvarṇa from Tamluk. But the biography makes no mention here of the Assam visit, and brings Hiuen Tsiang direct from Pauṇḍra Vardhana, or from Váchpá (? Vásibhá) to Karṇa Suvarṇa. M. Vivien de Saint Martin has pointed out the discrepancy in the note appended to M. Julien's third volume (p. 389). His idea is that the Si-yu-ki version should be unhesitatingly preferred because it is the primary account, and because it is more complete and consistent than that of Hwui-li.* But, as we have seen, neither account is exactly primary, and perhaps too M. Saint Martin has overlooked the difference in the character of the two works. The Si-yu-ki is a geographical treatise, and so all the information about each country is put in one place, whether the traveller visited it once or twice. For a similar reason, the order of visiting was, perhaps, not always exactly observed, though I have not found another instance of this. The biography on the other hand, joins the various journeys as they occurred. For instance, it describes Hiuen Tsiang as twice visiting Magadha or South Bihár; once on his way to Bengal and again on his return from Southern India, and after he had visited Gujrát, Sindh, and Mathurá. But the Si-yu-ki says nothing about the second visit. It also contains accounts of twenty-eight countries † which Hiuen Tsiang did not visit. It is therefore much less of a personal narrative than the biography is. The latter contains (Book V.) a detailed account of the Assam visit and of what had led to it. But it represents it as occurring after the second visit to Magadha, and it seems likely that Hiuen Tsiang went direct from Magadha to Assam, both because it was the shortest route, and because it was when he was at Nálanda that the Ambassadors from Kámrúp came to him. It was there, too, that S'ilabhadra urged his compliance with the invitation. Dr. Fergusson (J. R. A. S. VI. 252,) has also noticed the discrepancy between the two accounts. He believes that Hwui-li is more correct about the date and manner of the visit to Assam, but still he holds that he is wrong about the journey to Karṇa Suvarṇa!

There can be no question that the route through Bengal given in the biography is the more natural one of the two. It brings the traveller down to the delta along the course of the Ganges (in those days the Bhágírathí was probably the main stream), and then takes him west and south *via* Tamluk and Orissa. The Si-yu-ki on the other hand, makes Hiuen Tsiang diverge to the north-east,[*] or Pauṇḍra Vardhana, and also causes him to describe two sides of a nearly equilateral triangle, between Tamluk and Orissa. This may be seen from M. Saint Martin's map where, however, the route is made still more awkward by his supposition that Pauṇḍra Vardhana is Burdwan. This it cannot be, for the itinerary places it on the east of the Ganges.[†] It is rightly placed there in the Chino-Japanese map of 1710, of which M. Julien has given a reduction. It seems very unlikely, too, that Hiuen Tsiang would turn inland and to the N. W. after arriving at Tamluk. Presumably he went there in order to embark for Ceylon, as his predecessor Fa-Hian had done. The biography, at all events, tells us[‡] that he designed when at Tamluk, to sail to Ceylon and that he was dissuaded from doing so by a monk from southern India. This man advised him not to attempt so long and dangerous a navigation, but to sail from the S. W. point of India, whence he could make the journey in three days. This would give him an opportunity, the monk added, of visiting the sacred places of Orissa and other kingdoms, Hiuen Tsiang took this advice and started for the S. W. and arrived at Orissa. This is all straightforward; whereas the going to Karṇa Suvarṇa from Tamluk involved a *détour* of at least 140 miles.

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* At p. 365, l. c. M. Saint Martin in noticing another discrepancy between the two accounts gives the preference to the itinerary in the biography.

† The Si-yu-ki describes 138 countries, but Hiuen Tsiang only visited 110. Saint Martin, I. App.

For these reasons I am disposed to prefer the route given in the biography. I am not sure, however, if this is to the advantage of my contention that Karṇa Suvarṇa is Raṅgamáṭí. Neither route is discordant with the identification, but the Si-yu-ki one is more detailed. Raṅgamáṭí[§] is nearly due north of Tamluk and 120 or 130 miles off, and the borders of Orissa are about an equal distance to the S. W. of Raṅgamáṭí. We must not press Hiuen Tsiang's measurements closely, for we do not know the exact length of the *li*, nor do we always know to what points he refers. He generally speaks only of countries, not of towns, and it may be that the distances are those to and from the confines of kingdoms.

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[*] It describes the direction as easterly, but Koch Bihár and Kámrúp lie N. E. from Paṇḍuá.

[†] It seems a happy suggestion of Mr. Westmacott's that the name Pauṇḍra is preserved in Abú'l Faẓl's "Sarkár of Panjra." The chief objection to the identification of Paṇḍuá with Pauṇḍra Vardhana seems to be that the central or home-farm pargana of Sarkár Panjra, *viz.*, Havelí Panjra, lies N. E. of Dinájpur and far from Paṇḍuá which apparently is in Shashhazárí. [Áín, III, XV; Vol. II, p. 136 of Col. Jarrett's translation where it is called Sarkár Pinjarah. Ed.]

[‡] I. 183.

[§] There are several Raṅgamáṭís, and the best known, perhaps, is that in Lower Assam. But the one we have to do with is in Central Bengal and on the Bhágírathí. Sir H. Yule suggested that it might be the Kartasina of Ptolemy.

I now come to the principal object of my paper.

Hiuen Tsiang's accounts of Karṇa Suvarṇa are to be found at I. 181 and III. 84–88, of M. Julien's work.* He describes the kingdom as having a circumference of about 900 miles, and the capital as being about four miles round. The country was fertile and populous, and produced all kinds of fruit and flowers. The inhabitants were well off and had literary tastes, but they were a mixture of true believers (Buddhists), and heretics. There were thirteen monasteries, including those which followed the ritual of Devadatta, and there were fifty Hindú temples. Then comes the description which I rely upon: "By the side of the capital there rises the monastery called Lo-to-wei-chi-seng-kia-lan. Its halls are spacious and well-lighted, and its towers and pavilions are lofty. All the men of this kingdom who are distinguished for their talents, their learning and their intelligence, assemble in this monastery."

Lo-to-wei-chi-seng-kia-lan is, according to M. Julien, the phonetic rendering of the Sanskrit words *Raktaviṭi Saṅghárâma*, *i. e.*, the monastery of Redlands, and the word *Raktaviṭi* is, I submit, merely a synonym for Raṅgamáṭí. Saṅghárâma is the Buddhist word for a monastery, its original meaning being the grove, or enclosed garden of the congregation. Wei-chi is phonetic for *viṭi*, and Lo-to for *rakta* (blood,) and M. Julien and Mr. Beal agree in translating Lo-to-wei-chi as meaning red earth, one saying "*limon rouge*," and the other, "red mud." In his Index, III. 468, M. Julien uses a still more appropriate word for he renders wei-chi by "argile" or clay. Every one who has seen Raṅgamáṭí knows that its remarkable feature is the cliffs or bluffs of red clay. These extend for miles, are from 30 to 40 ft. high, and formed the bank of the river in the days when the Bhágirathi was the main stream of the Ganges. I must acknowledge that I have not been able to find in the Sanscrit dictionary the word *Viṭi*, though it is clear from the Chinese translation that it means earth. Raktavití would, of course, mean red, but I suppose that the Sanskrit equivalent of Raṅgamáṭí would be Rágamṛittika or Raktamṛittika. Possibly *mṛittiká* or *mṛitti* was what Hiuen Tsiang wrote, for in the biography† the word is given as Ki-to-mo-chi for which M. Julien substitutes, in accordance with the Si-yu-ki, Lo-to-wei-chi. But *mo-chi* may be right and may be phonetic for *mṛitti*. However this may be, I submit that the facts of the monastery being known by the name of Redlands and of Kaṛnasuvaṛnagaṛha, *i. e.*, the golden fortress of Karṇa, being the traditional name of Raṅgamáṭí, are almost conclusive of the latter's being the place visited by Hiuen Tsiang.

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* Beal, Life, 131, Si-yu-ki, II, 201.

† I. 181; Beal's translation, 132.

It is unnecessary for me to dwell on the evidence of Rangamáṭí's having once been a great city. This may be found in the paper of Col. Wilford in the 9th volume of the Asiatic Researches, p. 39, and in the descriptions by Capt. Layard, and Mr. Long. Capt. Layard's paper is in the 22nd volume of our Society's *Journal*, p. 281. He gives the name as Kansonapurí or Kurn-sona-ka-ghur, but Lassen * says the proper spelling is Karṇa suvarṇa gaḍa. As noticed by Capt. Layard there is a mound at Rangamáṭi, known as the Demon's Mount. This is probably a Buddhist *stupa* and should be excavated. There is also a story of a large signet-ring having been picked up on or near the mount, and having been taken to England. The local legend about the prosperity of the place, and the origin of the title Suvarṇa is that Vibhíshaṇa, the brother of Rávaṇa, visited the place on the occasion of the king's son's first meal of rice, and caused a shower of gold to fall on the land. It will be shown hereafter that there are other legends connecting the place with Ceylon. The Si-yu-ki goes on to tell how Buddhism was introduced into Karṇa Suvarṇa. It says that at a time when the people did not yet know the religion of Buddha, a heretical teacher came from the South of India and "beat the drum of discussion." His belly was covered with plates of copper, and he carried a torch on his head.† When asked why he was so attired,

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* III. 766 n.

† Reinaud in his "Memoir on India before the 11th Century," Paris 1849, p. 293, quotes an account from an Arabic work, the *Kitábu'l-fihrist*, of an Indian sect who took their name from the practice of girding their bodies with iron hoops. Every one who wished to enter this sect had to make a vow of sincerity and humility. He was obliged to have attained a certain degree of perfection before he could don the iron girdle. This girdle, according to the members of the sect, prevented the body from bursting with excess of knowledge, and power of contemplation.

The *Kitábu'l-fihrist* was written in 377 A. H , or 987 A. D., but it refers to an account of the Indian religions, which had been given by a man who had been sent in the last half of the eighth century by Yahya, the son of Khalad the Barmecide, to explore India. This account had been copied out by the famous Al-Kindí in 863 A. D. [Mr. C. J. Lyall, the President of the Society, has been kind enough to contribute the following note on this point :—

The passage in the *Fihrist*, to which M. Reinaud refers, is at p. 348, Vol. I, of Flügel's edition, (M. Reinaud wrote long before the publication of the text, and relied only on one faulty MS.). It runs thus—

و منهم اهل ملة يقال لهم البكرنتينية يعني المصفدين انفسهم بالحديد و سنتهم
انهم يحلقون رؤوسهم و لحاهم و يعرون اجسادهم ما خلا العورة و ليس من سنتهم
ان يعلموا احدا ولا يكلموه دون ان يدخل في دينهم و يامرون من يدخل في دينهم
بالصدقة للتواضع بها و من دخل في دينهم لم يصفد بالحديد حتى يبلغ المرتبة التي

he said that he had studied much, and had great wisdom, and so was afraid that he would burst; and that he carried a torch because he was moved with pity for the blindness of men. Ten days passed without any one being able to cope with him in argument. The king was in despair and said, "In the whole of my states are there no enlightened men? "If no one can answer the difficult questions of this stranger, it will be "a great disgrace for my kingdom. We must search again, and in the "most obscure places." Then some one said, that there was an extraordinary *śramaṇa* who lived in a forest. The king went in person to bring him. The *śramaṇa* said that he, too, came from Southern India; and that his learning was but small. However, he would endeavour to satisfy the king on condition that, if he was not worsted, the king would build a monastery, and send for monks to promulgate the law of Buddha. The king assented, and the *śramaṇa* came to the hall of discussion. The heretical doctor produced a writing containing 30,000 words, but, in spite of his profundity and science, he was vanquished by the *śramaṇa* after a hundred words, and had to retire in disgrace. Thereon the king fulfilled his promise of building a monastery, and has since that time, says the biography, zealously propagated the teachings of the law. In the preface of the Si-yu-ki[*] there is an allusion to the copper-sheathed belly which seems to imply that Hiuen Tsiang was the victorious *sramaṇa*, but as M. Julien remarks, this does not agree with the account in the body of the work.

Probably the king who built the monastery was Síláditya (the Sun of Righteousness), the Buddhist ruler of Kanauj.[†] The expression

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يستحق بها ذلک و تصفيدهم انفسهم من اوساطهم الى صدورهم لئلا ينشق بطونهم زعموا من كثرة العلم و غلبة الفكر ٭

In English:—

"Among them is a sect called the Bakrantínis (*sic:* conjectured to be Bakrabantíya, = Vajrabandhíya), that is to say, those who chain themselves with iron chains Their custom is to shave their heads and faces and to go naked, except as to their private parts. It is their rule not to instruct anyone, or to speak with him, until he spontaneously becomes a member of their sect. And they enjoin upon those accepting their religion to do alms in order that their pride may be humbled. One who joins their body does not put on the iron chains until he reaches the degree which entitles him to do so. They wear the chains from their waists to their breasts, as a protection against the bursting of their bellies—so they say—from excess of knowledge and stress of thought."

The conjecture Vajrabandhíya is Haarbrücker's (see *Fihrist*, Vol. II, p. 183). The passage appears to recur in Shahristáni's *Kitábu-n-Niḥal wal-Milal*, p. 449.—Ed.]

[*] II. XXXVII; Beal's translation, 1, 4.

[†] Possibly however it was Púrṇavarman of Magadha and who according to Hiuen Tsiang was the last descendant of Aśoka.

"in my states" seems to imply that he ruled over more than one kingdom. It is not likely that S'aśánka, the Hindú king of Karṇa Suvarṇa, would allow the introduction of Buddhism into his capital. I presume then that Hiuen Tsiang's visit was made after S'aśáṅka had been overcome by S'íláditya.

There are seven other references* to Karṇa Suvarṇa or to one of its kings. From them we learn that this king was called S'aśáṅka, *i. e.*, the moon, and that he was jealous of the power of Rájavardhana, the king of Kanauj, and the elder brother and predecessor of S'íláditya. He therefore lured him to a meeting and treacherously murdered him. We also learn that he was a great enemy of the Buddhists and cut down their sacred tree† (*Bodhidruma*). He must have possessed considerable power, for, after destroying the law of Buddha, he went to Patna and tried to deface a stone there which had been set up by Aśoka, and bore the marks of S'ákyamuni's feet. Lassen considers that the assassination of Rájavardhana‡ took place in 614, the year of S'íláditya's accession. He also holds § that S'aśáṅka must have retained his independence during S'íláditya's reign, or otherwise he never would have ventured to cut down the sacred tree. But it seems clear that S'aśáṅka had done this long before and in the time of S'íláditya's predecessor. The words "*dans ces derniers temps*" do not mean recently, and we are expressly told in the 6th book of the Si-yu-ki (II. 349; Beal, II, 42), that the destruction of the law and the dispersion of the monks by S'aśáṅka occurred a great many years ago. We also find the Bodhisattva, when exhorting S'íláditya to accept the crown, referring to S'aśáṅka's previous acts in destroying the law. And at p. 251 l.c. (Beal, I, 213) we are told that S'íláditya became master of the five Indies in his sixth year. According to Mr. Fleet, Harshavardhana, *i.e.*, *S'íláditya* began to reign in 606 or 607. So we may presume that Saśáṅka died not later than 613. The Si-yu-ki (p. 469; Beal, II, 122) describes the manner of his death and says it occurred a long time ago. S'aśáṅka must then, have been dead twenty or thirty years before Hiuen Tsiang went to Karṇa Suvarṇa. We know that there had been time to introduce Buddhism and to build a large monastery before he visited the place.

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* I. 112, 235, II. 248, 349, 422, 463, 468-9; Beal, Life, 83; Si-yu-ki, I, 210-213, II, 42, 91, 118, 121-2

† Púrṇavarman irrigated it with milk, and it shot up in a night to the height of ten feet. At the time of composing the Si-yu-ki it was 44 feet high. If this account be taken as correct, a botanist might calculate the date of Săśáṅka's violence.

‡ He calls him Harshavardhana. Mr. Fleet holds that the accession was in 606 or 607.

§ III. 686.

The name S'aśáṅka,* does not occur in Abú'l-fazl,† or Tieffenthaler,‡ but the first has a *Shashatdhar*, and the second a *Scheschdar*. These are clearly corruptions of S'aśadhara, (the moon,) and it is quite possible that this is another form of the name S'aśáṅka. Both words mean hare-marked or hare-bearing, *i. e.*, the moon, and apparently the pilgrim translates S'aśáṅka simply by the Chinese word for moon. If this is so, the fact is very important, for S'aśadhara belonged to the line of A'diśúra, and was the eighth in succession from him. He is said to have reigned 58 years, but the reigns of all the princes of this line seem unreasonably long. However if S'aśáṅka and S'aśadhara be identical, A'diśúra can hardly have been later than the first half of the 6th century. There seems nothing incredible in this for Lassen § says that he is wrongly referred to the 9th or 10th century, and that he must have lived in the beginning of the 7th century. But if he was not later than 600, he must, I think, be put back still further, for it was A'diśúra who brought Bráhmaṇs from Kanauj to Bengal. He could not have done this during the A'ditya dynasty for they were Buddhists. Their dynasty began according to Lassen in 580, and so A'diśúra must have reigned before that date, and perhaps was contemporary with one of the early Guptas.|| M. Saint Martin suggests that Hiuen Tsiang went out of his road to visit Karṇa Suvarṇa, on account of the connection of the neighbourhood with Vijaya and the conversion of Ceylon. This is not very likely, since Hiuen Tsiang says nothing about it, and he was not deeply interested in Ceylon, for he never went there. The fable, however, about Vijaya is interesting as showing an early connection between Bengal and Ceylon. Vijaya probably came from Singbhúm.¶ His story

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* Mr. Fleet's work, *Corpus Inscriptionum Indicarum*, III, for a reference to which I am indebted to Dr. Waddell's paper, shows (p. 283), that there is an inscription of S'aśáṅka at Rohtás. With reference to this identification, however, and also to General Cunningham's remark that there is a tank in Bogra named after S'aśáṅka, it may be well to bear in mind that according to the Buchanan MS., Vol. Bhágalpur I. 183, there was a S'aśáṅka, a Kshetauri Rájá of Kharakpur, who was put to death in 1502 (910 Fasli.) [*Apud* Moutgomery Martin, II, 57. Ed.]

† A'ín I. 413.

‡ Tieffenthaler, I. 472.

§ III. 718.

|| III. 393.

¶ His mother was the daughter of the King of Baṅga by a Kaliṅga Princess, a circumstance which points to an early connection between Bengal and the Madras coast. She was brought up in her father's city of Baṅga which presumably lay in South-east Bengal or somewhere about Samataṭa. There can be no doubt that the forest of Lála where the caravan in its way to Magadha (S. Bihár) was dispersed, and she fell into the power of a lion, is the Ráṛh country west of the Bhágírathí. See Upham, Sacred books of Ceylon, I. 69 and II, 164.

is told in Chapter VI of the Mahavansa, and in the 11th book of the Si-yu-ki. A more historical event is referred to by Wilford and Layard when they mention the local tradition that Raṅgamáṭí was destroyed by an expedition from Ceylon. This must have occurred after Hiuen Tsiang's visit to Karṇa Suvarṇa, and in my opinion, it belongs to the 12th century. I think that there is no reason to doubt the legend, for people are not in the habit of inventing disasters. But if true, it can only, I think, have occurred in the time of Parákrama Báhu, the Great. His reign is described by Turnour as having been the most martial, enterprising, and glorious in Singhalese history. He, too, seems to have been the only prince of Ceylon who carried his arms across the Bay of Bengal, or who possessed a fleet. There is an account of the expedition in the 76th Chapter of the Mahavansa.[*] It was directed against the king of Arámma, or Ramámma, which according to Mr. Wijesinha lay between Arracan and Siam. Five ships came to the port Kúsúmí, in the country of Ramámma and the troops "like furious elephants destroyed a great number of cocoa-nut and "other trees, and the places round about them, and burnt many "villages with fire and destroyed half of the kingdom." A Tamil general named Adhikári, who had volunteered for this service, cast anchor in the port of Papphala (Pippli ?). One of the ships attacked the island of Kákadvípa[†] (?) or Crow Island, and brought away many of the inhabitants as prisoners to Ceylon. Arimaddana, the king of Ramámma was killed by the invaders. Perhaps his name was Ari-Mardana, *i. e.*, the trampler of foes, or it may have been Hari-Madana. (It seems worth while to note here that there was a king of Orissa who was called Madana Mahádeva, and who had a short reign of four years from 1171–75.)

Kúsúmí as the name of the port, reminds us of Wilford's statement that Raṅgamáṭí used to be called Kusumapurí. The name, however, is a common one, and was applied to Patna and other towns. The statement that Ramámma is the country between Siam and Arracan is, perhaps, only a conjecture of Mr. Knighton, though I find that Sir Arthur Phayre mentions Ram-ma-we-li as a town and country near Sandoway (J. A. S. B. XIII. 27). On the other hand, we have Ramana marked in Gastaldi's old map,[‡] as a place east of Orissa and near Hijlí.

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[*] Wijesinha's translation. Colombo, 1889. See also Lassen IV. 328.

[†] Probably this is Cocanada in the Madras Presidency. According to the Imperial Gazetteer of India the proper spelling is Káka-náda and the meaning is Crow-country. If the Coromandel coast was the point of attack one can see why the services of a Madras officer were valuable.

[‡] Cluverius mentions Ramama as the capital of Orissa and as a mart famous for ivory and precious stones. He also says that the country was rich in salt. See

It may also be worth while mentioning that Sudhárám is a native name for the district of Noakhálí. I do not know its age or origin, but it may mean S'uddha-áráma, the place of delightful rest, and if so the last half of the name approaches the Arámma of Turnour. One reason given for the expedition was that "the king of Ramámma had obstructed persons who were bringing presents from a king of India to Ceylon." On one occasion when a certain chief of India, Kassapa by name, sent presents unto him (Parákrama) of great value, with a letter written on a leaf of gold, he hindered the men who bore them from landing and then caused the presents to be taken from them with the letter and sent into the city with great dishonour.* This looks like the action of a king of Orissa or Bengal, who would have control of the ports, such as Támraliptí, &c. It appears, too, that the expedition ravaged the coast of Coromandel, and so may easily have also attacked Bengal and Orissa. However this may be, and allowing that the expedition was directed against Siam or Cambodia, it must have been easy for the armament, on its way to or from the seat of war, to sail or march up to Raṅgamáṭi and destroy it. It is not likely that the ships would steer right across the Bay, or sail direct from Ceylon to Siam. It is to be hoped that some day Kákadvípa, Papphala, &c., will be satisfactorily identified.

As for the date of the expedition it was certainly not earlier than the 16th year of Parákrama Báhu's reign. According to Turnour his accession took place in 1153, so that the 16th year would be 1169. According to the Wijesinha, Parákrama's reign began in 1164, which would give 1180 as the 16th year. Lassen adopts Turnour's date of accession, but places the expedition in the year 1172. We are told that five months were employed in making preparations, and that provisions for twelve months were collected. It Mr. Wijesinha's date of accession then be correct, the expedition may have been as late as 1182 or '83. Under any circumstances it would be some years before the Muḥammadan invasion of Bengal.

According to the tradition collected by Capt. Layard there was a king of Raṅgamáṭi called Karṇa Sena. If this was so, he cannot have been the Karṇa who gave his name to the city. The latter was, perhaps, the Karṇa of the Mahábhárata, who was sometimes called Karṇa Dátta, and was half brother of the Páṇḍavas. He was king of Aṅga, and had seats at Bhágalpur and Monghyr. No such name as Karṇa occurs in the lists of the Vaidya kings of Gauṛ.

Brum's ed., Amsterdam, p. 332. Philip Cluvier or Cluverius was one of the most celebrated of our early geographers. He was born at Dantzic in 1580, and died at Leyden in 1623.

* Wijesinha's Mahávansa, p. 228.

NOTE ON DR. WADDELL'S PAPER.*

I did not know of or see Dr. Waddell's paper until I had nearly finished my own. He proposes to identify Karṇa Suvarṇa with Kañchannagar, near Burdwan. He has taken pains with the subject and his article contains some valuable information, but I think that his identification is quite untenable. It seems to me unfortunate that when Dr. Fergusson † and he had the clue in their hands they should have let it slip. Both of them refer to Rañgamáṭi, in Murshidábád; but both of them put it aside. Fergusson thought that the capital might afterwards have been transferred to Rañgamáṭi, and that in this way it got the name of Karṇa Suvarṇa, but he would not accept it as the place visited by Hiuen Tsiang, because he thought Hwui-li's account of the route to it incorrect. Apparently, too, he failed to notice that Rañgamáṭi was equivalent to the name of the monastery mentioned by Hiuen Tsiang. He choose Nagar in Birbhúm, a place which I have seen and which I think, has no claim to be Karṇa Suvarṇa. But a writer who refused to believe that the Támralipti of Hiuen Tsiang was Tamluk cannot be regarded as a safe guide.

Dr. Waddell has rejected Rañgamáṭi partly, as I conceive, because he has never seen it, and so does not know the evidence of ancient greatness which it exhibits. His words are as follows:—"The proposed identification with the fort of Kuru, near the village of Rañgamáṭi, in Murshidabad district, about 130 miles to the north-east of Tamluk, is quite untenable, as it is so out of keeping with the pilgrim's text, and possesses nothing suggestive of the site, except the local name of Rañgamáṭi, and having proceeded so far northwards, the subsequent journey of 700 li to the south-west could not carry the pilgrim to the frontier. much less to the capital of Orissa, his next stage.‡

I do not know what is meant by the phrase "proposed identification" in this extract. So far as I know, Rañgamáṭi has never been proposed before. Perhaps Colonel Yule made such a proposal, but if so, the reference given by him, J. R. A. S. XVIII. 395, is wrong. The only reference given by Dr. Waddell is to Captain Layard's paper, but certainly that says nothing about Hiuen Tsiang. It was hardly possible, if not quite impossible, that it should, for Layard's paper was published in our Society's *Journal* in 1853, and M. Julien's translation of the biography only appeared in that year, and this translation of the Si-yu-ki not till 1858. Nor do I know what is meant by the "fort of Kuru." Nobody has ever used that name or spoken about the Kurus in connection with Raṅgamáṭi. As to the distance-difficulty, I quite admit that so far Burdwan may agree as well with Hiuen Tsiang's statement as Raṅgamáṭí. I do not think, however, that it has any superiority in this respect. I do not know why it should be assumed that Jájpur was the capital of Orissa in Hiuen Tsiang's time, or that his distances are for capitals and not for the confines of kingdoms. The direction of Burdwan from Tamluk is a little more westerly than that of Raṅgamáṭí, but still it is mainly north. Besides Dr. Waddell takes no notice of the route given in the biography, *viz.*, that from Paṇḍuá, or from the monastery five miles to the west of it. That route certainly agrees better with Raṅgamáṭí than with Burdwan. However, I lay little stress on directions and still less on distances. The two strong points in favour of Raṅgamáṭí are—first, it used to be called the Fort of Karṇa Suvarṇa, and secondly, that Raṅgamáṭí is an equivalent for Rakta-Viṭi and Lo-to-wei-chi, or Lo-to-mo-chi. Raṅgamáṭí is not the only place in the neighbourhood which is associated with Karṇa. The village and *thánú* of Go-Karṇa, *i. e.*, the cowshed of Karṇa, is close by.

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* Published by the Government of Bengal last year, as an Appendix to a paper on Páṭalíputra.

† J. R. A. S., VI. 248.

‡ p. 25.

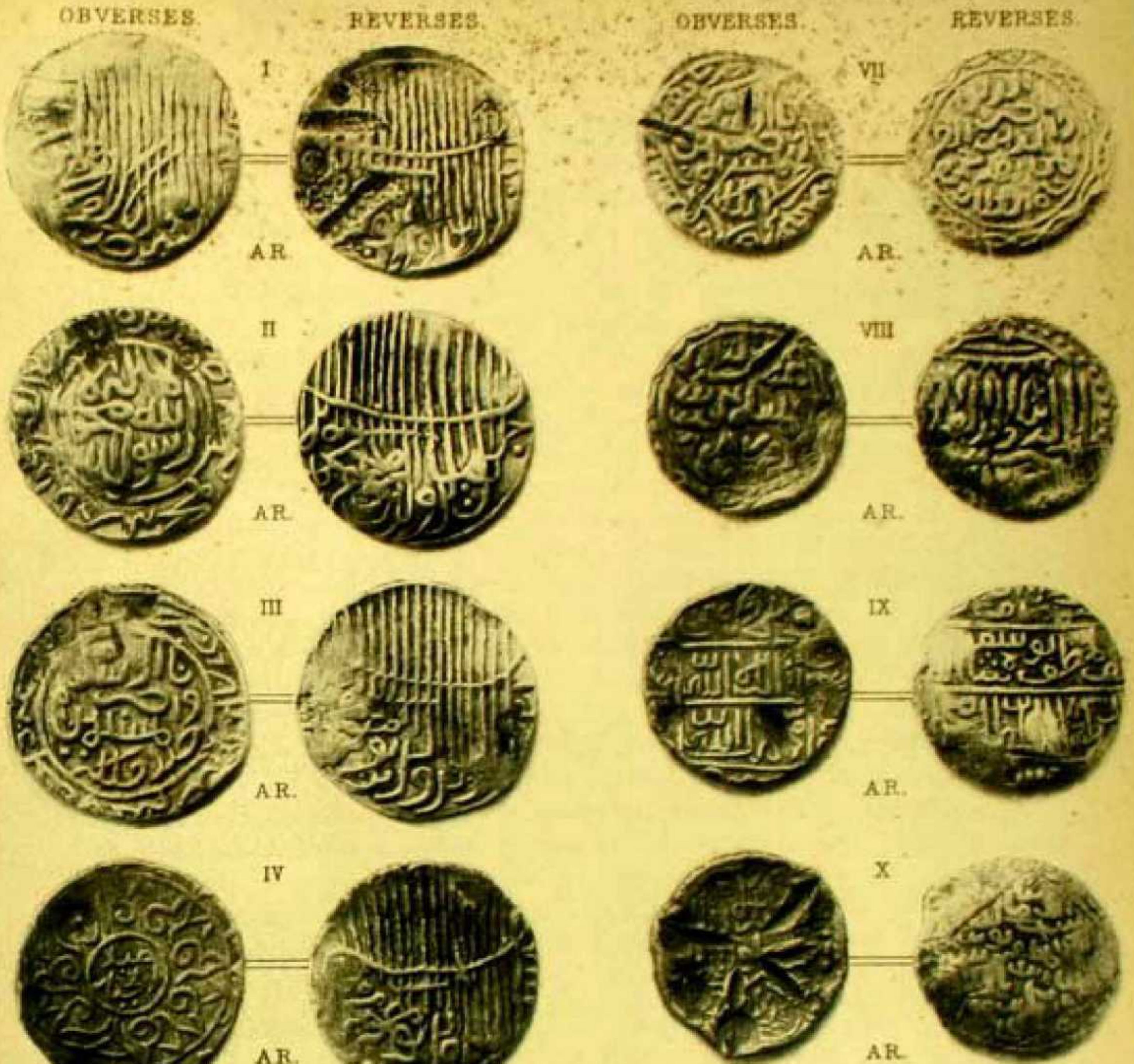
On the other hand, Kañchannagar seems to be an obscure place, a sort of suburb of Burdwan. No evidence is adduced of its having been "the traditional capital of the country." I do not know who Belásur was, but I see that Captain Layard says there was a tank at Raṅgamáṭí called the Bel Talao. Probably the name is connected in both instances with the Bael tree, which is sacred to Siva. There is also at Raṅgamáṭi the almost obliterated site of an ancient tank called the Jamuná Tank and in which a curious image figured by Captain Layard was found.

Kañchannagar is a common name in Bengal, and has its own distinct meaning, *viz.*, the city of gold. I do not see how it can be twisted into meaning the city of Karṇa Suvarṇa.

P. S.—I have lately come upon an interesting piece of evidence about the antiquity of the name of Karṇa Suvarṇa. In the genealogy of Rájá Rádhá Kánta Deva, prefixed to the 8th volume of the S'abdakalpadruma, and also in the sketch of his life by the editors of the second edition, it is stated that his earliest known ancestor, S'rí Hari Deva, was a resident of Karṇa Suvarṇa, near Murshidábád. Rájá Rádhá Kánta was the twenty-fifth in descent from S'rí Hari, and was himself born in 1783, so that S'rí Hari probably lived in the 12th century. Rájá Rádhá Kánta lived to at least the age of 76, and if we allow 26 years for each generation of his ancestors, S'rí Hari may have lived at Karṇa Suvarṇa before its destruction by the troops of Parákrama Báhu.

For convenience of reference I subjoin Wilford's notes of Raṅgamáṭí in the 9th volume of the Researches: "Tradition says that the “king of Lanká, which implies either the country of the Mahárájah of Lapági or Ceylon, but more probably the first, invaded the country of Bengal with a powerful fleet and sailed up the Ganges as far as Rańgamáṭi, then called Kusumapuri, and a considerable place where the King or Mahárája often resided. The invaders plundered the country and destroyed the city. This happened long before the invasion of Bengal by the Musalmans, and seems to coincide with the time of the invasion of the peninsula by the Mahárája of Lapági. This informatiom was procured at my request by the late Lieutenant Hoare, who was remarkably fond of inquiries of this sort, and to whom I am indebted for several historical inquiries and other particulars relating to the geography of the Gangetic provinces.”

Apparently Lieutenant Hoare is the officer referred to as Captain Hoare in the 7th vol. of the Researches, p. 175, as having taken part in procuring copies of the inscriptions on the Dihlí pillar. Wilford thought that Lanká might mean Lapági, *i. e.*, Java, because two Arabian travellers of the 9th century mentioned by Rouondot had referred to the king of Lapági's having devastated the coast of India. But there seems no reason for supposing that Lanká ever meant any other place than Ceylon. Layard, writing in 1853, says, he too was told of the Lanká expedition, but with a different version. Unfortunately he does not give the version, but, perhaps, it was only that the place was Ceylon and not Java. Layard objects to Lieutenant Hoare's account that Rańgamáṭi was formerly called Kusumapura, but it is just possible that it was both called Kusumapura and Karṇa Suvarṇa. Or the Ceylonese may have been mistaken, like Lieutenant Hoare, and written Kusumi instead of Karṇa Suvarṇa.



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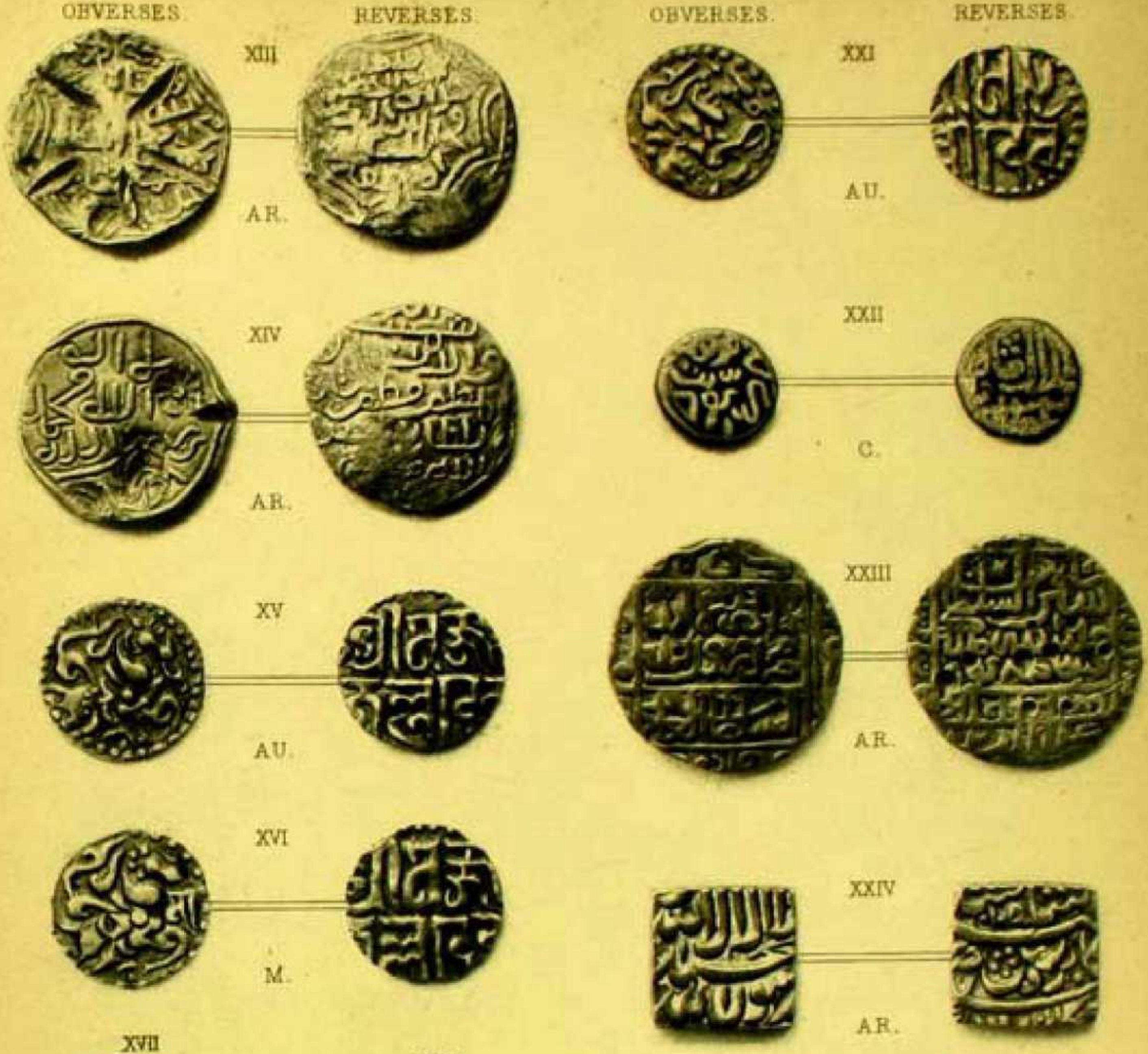
SOME NEW OR RARE MUHAMMADAN & HINDU COINS.



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Survey of India Offices, Calcutta, November 1893.

SOME NEW OR RARE MUHAMMADAN & HINDU COINS.

INDEX.

Names of New Genera and Species have an asterisk (*) prefixed.

Abies, 155
Abrus, 85
,, *precatorius*, 48, 55, 70
Acacia concinna, 48, 49, 50, 70
ACANTHACEÆ, 74
Acanthocyathus, 138
,, *grayi*, 138
ACANTHOPTERGII, 177
Acis, 171
Acronychia, 205, 214, 215
,, *laurifolia*, 214
,, *pedunculata*, 215
,, *Porteri*, 214, 215
Acrostichum appendiculatum, 48
,, ,, (var. *setosa*, 82
,, *aureum*, 82, 84
,, *costatum* var. *deltigera*, 82
,, *scandens*, 82, 84
Actephila, 86
,, *excelsa*, 48, 75
,, *javensis*, 75
ACTINIARIA, 151, 169
Adansonia, 68
Adiantum lunulatum, 56, 81.
Ægle, 205
Aganosma marginata, 54, 73
Alcyonacea, 171
ALGÆ, 50, 53, 55, 83, 84
Allophylus Cobbe, 48, 69
Alsodeia bengalensis, 48, 65
Amoora cucullata, 158
,, *decandra*, 48, 69
,, *Rohituka*, 50, 69.
Amorphophallus, 48, 49, 80, 85
,, *bulbifer*, 80
,, *campanulatus*, 80
,, *oncophyllus*, 80
,, *rex*, 80
,, *tuberculiger*, 80
,, *virosus*, 80
* ,, *(Candarum) rex*, 79
AMPELIDEÆ, 69
Amyris punctata, 221
,, *simplicifolia*, 226
,, *sumatrana*, 221
ANACANTHINI, 180
ANACARDIACEÆ, 70
Anamirta Cocculus, 50, 65
ANCISTROCLADEÆ, 89
Ancistrocladus, 87, 89, 157,
,, *extensus*, 137
,, ,, var. *pinangianus* 137
,, *guineensis*, 137
,, *pinangianus*, 137
,, *sagittatus*, 234
Ancistrolobus, 137
ANDESITE, 166
Anisoptera, 88, 96, 100
,, *Curtisii*, 100
,, ,, var. *latifolia*, 100
,, *odorata*, 101
Anodendron paniculatum, 50, 73
Anthogorgia, 171
ANTHOZOA ACTINIOMORPHA, 169
,, ALCYONIOMORPHA, 171
Antiaris, rufa, 76
,, *toxicaria*, 48, 76
Antitaxis calocarpa, 50, 65
APOCYNEÆ, 73
Apodytes andamanica, 50, 69
ARCHASTERIDÆ, 171
Ardisia humilis, 47, 55, 72
Aristolochia Tagala, 50, 74
ARISTOLOCHIACEÆ, 74
AROIDEÆ, 79
ARTHROPODA, 176
Artocarpus Lacoocha, 48, 76
Arum campanulatum, 80
Arytera macrocarpa, 236
ASCLEPIADACEÆ, 73
Aspidopterys, 192. 193, 195
,, *concava*, 195
,, *Helferiana*, 195
Asplenium falcatum var. *urophyllum*, 82
,, *nidus*, 50, 82
,, *urophyllum*, 48
ASTEROIDEA, 171
ASTROPECTINIDÆ, 172
ASTROPHYTIDÆ, 173
Astroschema, 169, 173
* ,, *flosculus*, 173
Atalantia, 206, 224
,, *floribunda*, 225
,, *longispina*, 224
,, *macrophylla*, 225
,, *monophylla*, 225
,, *platistigma*, 225

Atalantia Roxburghiana, 225
AURANTIACEA, 219
Avicennia officinalis, 160
Balanocarpus, 89, 130, 132, 133, 134, 135.
,, *anomalus*, 130, 132
,, *Curtisii*, 130, 131, 132
* ,, *Heimii*, 131, 133
* ,, *Hemsleyanus*, 131, 134
* ,, *maximus*, 131, 133
* , *penangianus*, 130, 131
* ,, *Wrayi* 131, 134
Balanophyllia, 144
* ,, *scabra*, 144, 149
Balsamina angustifolia, 204
BALSAMINEÆ, 198
Banistiria bengalensis, 195
,, *tetraptera*, 195
,, *unicapsularis*, 195
Barringtonia racemosa, 158
,, *speciosa*, 47, 53, 71
Bathyactis, 148, 149
* ,, *stephanus*, 149
,, *symmetrica*, 149
* *Bathypercis*, 177
* ,, *platyrhynchus*, 178
Bathypterois, 178
Bergera integerrima, 219
BIGNONIACEÆ, 74
BIOLITE, 166
Biophytum, 198, 199
,, *adiantoides*, 199, 200
,, *sensitivum*, 199
Blachia andamanica, 48, 75
Blumea glomerata, 47, 72
,, *laciniata*, 72
,, *myriocephala*, 50, 72
Bœhmeria malabarica, 50, 76
Boerhaavia, 47
,, *repens*, 48, 56, 74
Bombax, 48, 65, 68
,, *anceps*, 66, 67
,, *asiaticæ*, 65
,, *cambodiense*, 67
,, *festivum*, 67
,, *insigne*, 66, 67, 68
,, ,, var. *alba*, 66, 67
,, ,, ,, *anceps*, 66
,, *insigne* var. *andamanica*, 67
,, ,, ,, *cambodiensis*, 67
,, ,, ,, *genuina*, 67
,, ,, ,, *larutensis*, 68
* ,, ,, ,, *polystemon*, 65, 67
,, ,, ,, *typica*, 67
,, ,, ,, *Wightii*, 67
,, *malabaricum*, 66, 68
,, ,, var. *albiflora*, 66
,, *pentandrum*, 66, 68
Brachylophon, 192, 193, 196
,, *Curtisii*, 196, 197
,, *Hullettii*, 196
* *Scortechinii*, 196, 197
Bregmaceros, 181
,, *MacClellandii*, 181
Brewstera crenata, 191
Breynia, 49
,, *Rhamnoides*, 48, 75
Bridelia tomentosa, 48, 75
Brissopsis, 174
* ,, *Oldhami*, 174
Brucea, 226, 228,
,, *dulia*, 228
,, *sumatrana*, 228
Bryum coronatum, 50, 56, 83
BURSERACEÆ, 68, 235
Cactus, 157
Cæsalpinia Bonducella, 48, 70
Calliaster, 172
* ,, *mamillifer*, 172
Callicarpa arborea, 50, 54, 55, 74
Callionymus, 178
Calophyllum inophyllum, 49, 65
Calothrix, 53
Calothrix pulvinata, 83
,, *tasmanica*, 55, 83
Canarium, 184, 185, 236, 237, 238, 246, 250, 255
,, *altissimum*, 257
,, *bengalense*, 184, 185, 186, 187 188, 242
,, *Bennettii*, 250
* ,, *caudatum*, 238, 240
,, *coccineo-bracteatum*, 239, 246
,, *commune*, 239, 246
,, *denticulatum*, 249
,, *dichotomum*, 243
,, *Euphyllum*, 68, 188, 238, 241, 247
,, *eupteron*, 258
,, *glaucum*, 239, 249
,, *grandiflorum*, 238, 242
,, *hirtellum*, 239, 243, 244
,, *Kadondon*, 239, 247
* ,, *Kunstleri*, 239, 248
,, *lævigatum*, 257
,, *laxum*, 255
* ,, *Manii*, 239, 247
,, *nitidum*, 240, 241, 251
,, *oblongifolium*, 258
,, *parvifolium*, 238, 240, 241, 251
,, *pilosum*, 239, 243
,, *Planchoni*, 238, 240
,, *purpurascens*, 239, 245
,, *reziniferum*, 188
,, *rubiginosum*, 239, 248
,, *rufum*, 239, 243, 244, 250
,, *secundum*, 239, 250
* ,, *sikkimense*, 187, 188
,, *strictum*, 184, 185, 186, 187, 188
,, *sub-repandum*, 258
Canavalia turgida, 48, 70
* *Candarum rex*, 79

Cansjera Rheedei 48, 69
CAPPARIDEÆ, 65
Capparis sepiaria, 48, 49, 50, 56, 85
,, ,, var. *grandifolia*, 65
,, *tenera*, 49
,, ,, var. *latifolia*, 65
Carapa moluccensis, 69, 158
Carica Papaya, 78
Caryota, 86
,, *mitis*, 50, 77
,, *sobolifera*, 77
CASSIDULIDÆ, 173
CERIANTHINEÆ, 151, 153, 169
Cerianthus, 153, 169, 170
,, *americanus*, 153
* ,, *andamanensis*, 153
* ,, *tenebrarum*, 169
Ceriops Candolleana, 158
Chalcas paniculata, 220
,, *sumatrana*, 220
CHALCEDONY, 165
CHAMPAK, 153, 154
* CHARNOCKITE, 164
Cheilanthes tenuifolia, 54, 82
Chionotria monogyna, 217
,, *rigida*, 217
Chorisia, 68
Citrus, 205
,, *angulata*, 224
Clausena, 206, 220
,, *excavata*, 220
,, *simplicifolia*, 215
Cleisostoma, 157
Clerodendron inerme, 49, 74
,, *sericeum*, 194
Cocos, 56
,, *nucifera*, 77
CŒLENTERATA, 169
Cœnopsammia, 146
,, *urvillii*, 146
Collema nigrescens, 83
Colquhounia, 30, 31, 32, 35
,, *coccinea*, 30, 31, 32, 33, 34, 35, 36, 37, 38
,, ,, var. *major*, 31, 32 33, 36
,, ,, ,, *mollis*, 34, 37
,, * ,, ,, *parviflora*, 31, 32, 33, 36
,, ,, ,, *typica*, 35
,, ,, ,, *vestita*, 36
,, *elegans*, 30, 31, 32, 33, 34, 35, 37, 38
,, ,, var. *pauciflora*, 38
,, ,, ,, *tenuiflora*, 38
,, ,, ,, *typica*, 37
,, *martabanica*, 33, 38
,, *mollis*, 32, 33, 34, 35, 37, 38
,, *parviflora*, 37, 38
,, *pauciflora*, 38
,, *tenuiflora*, 33, 34, 38
Colquhounia, *tomentosa*, 33, 37
,, *vestita*, 30, 31, 32, 33, 34, 36, 37
,, ,, var. *rugosa*, 33, 34, 37,
Colubrina asiatica, 48, 49, 66, 69
COMBRETACEÆ, 70
COMMELINACEÆ 77
COMPOSITÆ, 72, 84, 85
Congromuræna, 183
,, *longicauda*, 183
,, *megastoma*, 183
* ,, *nasica*, 183
* ,, *squaliceps*, 183
CONIFERÆ, 153, 155
Connaropsis, 198, 200, 202
,, *dioica*, 201
,, *Griffithii*, 200
* ,, *macrophylla*, 200, 201, 202
,, *monophylla*, 200, 202
Conus, 143
Convolvulaceæ, 73, 84
Convolvulus parviflorus, 47, 73
Cookia graveolens, 221
CRUSTACEA, 176
CUCURBITACEÆ, 71
Cyathohelia, 169, 171
,, *axillaris*, 171
Cyclea peltata, 55, 65
Cycloseris, 147, 148
,, *cyclolites*, 147
,, *discus*, 147
* ,, *mycoides*, 147, 149
,, *sinensis*, 147
Cyclostemon assamicus, 75
,, *macrophyllus*, 75
Cyminosma Ankenda, 215
,, *pedunculata*, 215
CYPERACEÆ, 81
Cyperus pennatus, 47, 81
Dalbergia monosperma, 48, 70
,, *tamarindifolia*, 54, 70
Dapania, 198, 201, 202
,, *racemosa*, 202
,, *scandens*, 201, 202
Davallia solida, 81
,, *speluncæ*, 50, 81
Debis, 6
DECAPODA, 176
Dedaelea griercina, 83
Dendrobium, 55, 76
,, *Pierardi*, 157
Dendrophyllia, 146, 171
,, *gracilis*, 146
,, *nigrescens*, 171
Derris scandens, 70
Desmodium polycarpon, 47, 55, 70
Diaxeris, 147, 148
,, *distorta*, 147
* ,, *fragilis*, 148, 149
,, *freycineti*, 147, 148
Dilleniacea nervosa, 122

DIORITE 166
Dioscorea, 55, 56, 85
,, *glabra*, 77
,, *sativa*, 49, 77
DIOSCOREACEÆ, 77
Diospyros Kurzii, 48, 73
• *Dipsacaster*, 172
• ,, *pentagonalis*, 172
,, *sladeni*, 172
DIPTEROCARPEÆ, 87, 121, 137
Dipterocarpus, 88, 89, 94, 98, 99
,, *alatus*, 90, 98, 99
,, *angustifolius*, 99
,, *Blancoi*, 95
,, *cornutus*, 90, 93
,, *costatus*, 98, 99
,, *crinitus*, 89, 90, 91
,, *Dyeri*, 96
,, *fagineus*, 90, 94, 99
,, *gracilis*, 99
,, *grandiflorus*, 90, 95, 96, 97
,, *Griffithii*, 90, 96, 99
,, *Hasseltii*, 93
,, *hirtus*, 91
,, *incanus*, 90, 97, 98
,, *indicus*, 92, 93
,, *intricatus*, 99
• ,, *Kerrii*, 89, 93
• ,, *Kunstleri*, 90, 96
,, *laevis*, 92, 93
,, *lamellatus*, 99
,, *Lemeslei*, 99
,, *Lowii*, 99
,, *Motleyanus*, 96
,, *oblongifolius*, 90, 95
,, *pilosus*, 99
,, *prismaticus*, 94
,, *pterygocalyx*, 96
,, *retusus*, 96
• ,, *Scortechinii*, 89, 91
• ,, *Skinneri*, 89, 91
,, *stenopterus*, 95
,, *Tamparan*, 91
,, *trinervis*, 96
,, *tuberculatus*, 93
,, *turbinatus*, 89, 92
,, ,, var. *andamanica*, 92
Dischidia nummularia, 50, 73
Discotrochus, 142
• ,, *investigatoris*, 142, 149
Dodonæa, 86
,, *viscosa*, 54, 69
Doona, 126
Dracæna angustifolia, 47, 77
Dryobalanoidea, 123, 125
Dysomma bucephalus, 184
EBENACEÆ, 73
ECHINODERMA, 169, 171
Echinogorgia, 171.
ECHINOIDEA, 173
Echinolampas, 169, 173
• ,, *castanea*, 173
,, *spheroidalis*, 174
Entada scandens, 49, 70
Epizoanthus, 152
,, *stellaris*, 152
Eranthemum succifolium, 47, 74
Eriodendron, 68
,, *anfractuosum*, 66
Erioglossum edule, 48, 69
Erites, 1, 2, 6
,, *angularis*, 2, 3, 4, 5, 6
,, *argentina*, 2, 3
,, *elegans*, 2, 3, 4
,, *falcipennis*, 2, 6
,, *medura*, 2, 3, 5, 6
,, ,, var. *ochreana*, 3
,, *ochreana*, 1, 3
• ,, *rotundata*, 2, 4, 5, 6, 7
,, *undularis*, 9
Erythrina indica, 47, 70
Erythroxylon, 189, 190
,, *burmanicum*, 190
,, *retusum*, 190
,, *sumatranum*, 190
EU-DIPTEROCARPEÆ, 87
Eugenia Jambolana, 55, 71
Eu-Hopea, 123, 126
EUPHORBIACEÆ, 75, 84, 86
Eupsammia, 144
• ,, *regalis*, 144, 149
EUPSAMMIDÆ, 144, 171
EURITE, 165, 166, 167
Eurycoma, 227, 229
,, *apiculata*, 229, 230
,, *longifolia*, 229, 230
,, *merguensis*, 230
,, *tavoyana*, 230
Eu-santiria, 237, 238
Eu-shorea, 108.
EUTAXITE, 165
EUTHEMIDEÆ, 231
Euthemis, 231, 234
,, *elegantissima*, 235
,, *leucocarpa*, 234, 235
,, *minor*, 234, 235
Eu-Vateria, 127
Eu-Vatica, 101, 102
Evodia, 205, 206
,, *euneuron*, 209
,, *glabra*, 207, 208, 209
,, *latifolia*, 206, 207, 209
• ,, *macrocarpa*, 207, 209
,, *Marambong*, 208
• ,, *pachyphylla*, 207, 210
,, *pedunculosa*, 207, 211
• ,, *pilulifera*, 207, 210
,, *robusta*, 207, 209
,, *Roxburghiana*, 207, 208, 209
,, *triphylla*, 208
Excæcaria agallocha, 158

Fagara Lunur-ankenda, 208
,, *triphylla*, 208
Ficus, 48, 50
,, *Benjamina*, 76
,, *brevicuspis*, 49, 76, 83
,, *callosa*, 49, 76
,, *comosa*, 48
,, *cuneata*, 190
,, *cuspidifera*, 56
,, *gibbosa* var. *cuspidifera*, 75
,, *glaberrima*, 50, 75
,, *hispida*, 48
,, ,, var. *dæmonum*, 76
,, ,, ,, *typica*, 76
,, *nervosa*, 76
,, *nitida*, 48, 56
,, *retusa* var. *nitida*, 76
,, *Rumphii*, 48, 56, 76
,, *variegata*, 76
FILICES, 81
Fimbristylis, 55
,, *diphylla*, 58, 81
,, *ferruginea*, 47, 54, 81
Flabellum, 138
,, *aculeatum*, 138
,, *japonicum*, 170
,, *laciniatum*, 170
,, *oweni*, 138
,, *spinosum*, 138
,, *stokesi*, 138
,, *variabile*, 138
Flueggia, 73
,, *microcarpa*, 53, 54, 75
FUNGIDÆ, 147
FUNGUS, 50, 56, 83
GADIDÆ, 180
Gærtnera racemosa, 194
Gallesioa graveolens, 221
GARNET, 162, 163, 164
Garuga pinnata, 49, 55, 68
Gela lanceolata, 215
Gelonium bifarium, 48, 54, 56, 75
GERANIACEÆ, 197
Globigerina, 177
Glochidion calocarpum, 48, 56, 75
Gloriosa superba, 56, 77
Glycosmis, 205, 216
,, *arborea*, 216
,, *chylocarpa*, 216
,, *cyanocarpa* var. *sapindoides*, 218
,, *macrophylla*, 217
,, *nitida*, 217
,, *pentaphylla*, 48, 68, 216, 218
,, ,, var. *longifolia*, 217
,, ,, ,, *macrophylla*, 917
,, ,, ,, *macrorachis*, 217
,, *puberula*, 216, 218
,, *Retzii*, 216
Glycosmis, sapindoides, 216, 217
,, *triphylla*, 217
Gomphia, 231, 232
,, *angustifolia*, 233
,, *Hookeri*, 232, 233
,, ,, var. *corymbosa*, 233.
,, *pulcherrima*, 233
,, *sumatrana*, 232, 235
,, *sumatrensis*, 233
Gonocitrus angulatus, 224
GOODENOVIEÆ, 72
Gordonia decandra, 192
,, *peduncularis*, 191
Gorgonacea, 171
Gorgonella, 171
Gouania leptostachya, 50, 69
GRAMINEÆ, 81
GRANITE, 136
GRANILITE, 166
Grewia, 49
,, *lævigata*, 49, 68
Guettarda, 48
,, *speciosa*, 47, 72
GUTTIFERÆ, 65
Gyrocarpus Jacquinii, 49, 71
Harrisonia, 226, 227
,, *Brownii*, 227
Heritiera fomes, 158
,, *littoralis*, 50, 53, 68
Heterocyathus, 141, 146, 148
,, *æquicostatus*, 141, 142
,, *phillippensis*, 141, 142
• ,, *wood-masoni*, 141, 149
Heteropsammia, 141, 145, 146, 148
• ,, *aphrodes*, 145, 149
,, *geminata*, 145
,, *ovalis*, 145
,, *rotundata*, 145
Hibiscus tiliaceus, 47, 48, 49, 56, 65
Hipparchia medura, 3
Hiptage, 192, 193
,, *javanica*, 194
,, *madabrota*, 194
,, *parviflora*, 194
,, *sericea*, 193, 194
,, ,, var. *longe-racemosa*, 194
Hiræa concava, 195
,, *indica*, 196
,, *merguensis*, 195
Hirneola polytricha, 83
HOMOLIDÆ, 177
Hopea, 88, 115, 123, 124, 125, 126
,, *cernua*, 125
• ,, *Curtisii*, 123, 124
,, *Dryobalanoides*, 125, 126, 127
,, *faginea*, 105
,, *grandiflora*, 101
,, *gratissima*, 115
• ,, *intermedia*, 123, 125, 126
,, *maranti*, 121
,, *Mengarawan*, 125, 126

Hopea, micrantha, 123, 124, 125, 126, 127
* ,, *nervosa*, 123, 124
,, *Singkawang*, 123
Hoya, 85
,, *diversifolia*, 73
,, *orbiculata*, 47, 73
parasitica, 73
Hyalonema, 152
Hydrocera, 198, 204
,, *angustifolia*, 204
,, *triflora*, 204
Hypericinea dentata, 191
,, *macrocarpa*, 192
HYPERSTHENE, 162, 163, 164
Hypsophrys, 177
superciliosa, 177
Icicopsis, 237
Impatiens, 198, 202
,, *chinensis*, 203, 204
,, *Griffithii*, 203
,, *mirabilis*, 203
natans, 204
,, *triflora*, 204
Ipomæa biloba, 47, 48, 53, 73
,, *denticulata*, 48, 73
,, *grandiflora*, 47, 73
,, *Turpethum*, 49, 73
,, *vitifolia*, 48, 73
Irvingia, 227, 230
,, *malayana*, 230
Isauxis, 102, 127, 135, 136
Ischæmum, 85
,, *muticum*, 54, 31, 85
Isoptera, 88, 129
,, *borneensis*, 129
Ixonanthes, 189, 191
,, *cuneata*, 191
,, *dodecandra*, 191
icosandra, 191, 192
,, *obovata*, 191
,, *reticulata*, 191, 192
Ixora brunnescens, 47, 49, 56, 72
,, *cuneifolia*, 55, 72
Jambolifera pedunculata, 215
Juncella, 171
LABIATAE, 30, 31, 34, 35
Leea sambucina, 48, 69
LEGUMINOSÆ, 70, 84
Lenzites platyphyllus, 83
Lethe, 6
,, *europa*, 6
LICHENES, 83
LILIACEÆ, 77
Limonia angulata, 224
,, *arborea*, 216
,, *diacantha*, 221
,, *leptostachya*, 214
,, *monophylla*, 225
,, *pentaphylla*, 216
,, *scandens*, 222
,, *trifoliata*, 221
LINEÆ, 189
Lophius, 179
* ,, *mutilus*, 179
Lophohelia, 143
Lovenia, 175
* ,, *gregalis*, 175
Luvunga, 206, 221
,, *eleutheranthera*, 222
,, *scandens*, 222
,, *tavoyana*, 222
LYCOPODINEÆ, 81, 84
Lycopodium cernum, 54, 81
Macaranga, 86
,, *Tanarius*, 50, 55, 75
Macharisia icosandra, 191
Madrepora axillaris, 171
Madreporaria aporosa, 170, 171
MAGNETITE, 162, 163
Magnolia, 154
MAGNOLIACEÆ, 153
Mallotus, 86
,, *andamanicus*, 48, 75
MALPIGHIACEÆ, 192
MALVACEÆ, 65
MELASTOMACEÆ 71
MELIACEÆ, 69
Melicope, 205, 212
,, *Helferi*, 212
,, *tetrandra*, 212
Memecylon edule, 48, 71
Meniscium deltigerum, 82
MENISPERMACEÆ, 65
MICROLINE, 162, 164
Micromelum, 206, 218
,, *hirsutum*, 218, 219
,, *pubescens*, 218, 219
Mitreola, 85
,, *oldenlandioides*, 53, 73
Mocanera grandiflora, 96
Molina racemosa, 194
MOLLUSCA, 176
Morinda, 48
,, *bracteata*, 47, 50, 56
,, *citrifolia* var. *bracteata*, 72
Mucuna gigantea, 48, 70
MURÆNIDÆ, 183
Murex palmarosæ, 176
Murraya, 206, 219
,, *brevifolia*, 220
,, *Burmanni*, 221
,, *exotica*, 220
,, *Glenieii*, 220
, *paniculata*, 220
, *sumatrana*, 220
Musa, 85, 86
,, *sapientum*, 77
MUSCI, 82
Mussænda macrophylla, 54, 71
Myristica glauca, 50, 74
MYRISTICACEÆ, 74
Shorea, stellata, 109, 120

MYRSINEÆ, 72
MYRTACEÆ, 71
Myxospermum chylocarpum, 217
Nacula, 176
Neckera, 84
,, *rugulosa*, 50, 82
NEMATOPHORA, 169
Neobythites, 181
* ,, *steatiticus*, 181
Nephrodium terminans, 50, 82
Nephrolepis tuberosa, 54, 55, 82
Nipa fruticans, 158
NYCTAGINEAE, 74
Nymphæa, 154
Ochna, 231
,, *andamanica*, 232
,, *crocea*, 233
,, *nitida*, 232
,, *obtusata*, 232
,, *squarrosa*, 232
,, *stipulacea*, 232
,, *Wallichii*, 231, 232
OCHNACEÆ, 231
OCHNEÆ, 231
OCULINIDÆ, 143, 171
Odina Wodier, 49, 70
Odontostomus, 169, 182
* ,, *atratus*, 182
OLACINEÆ, 69
Oldenlandia, 85
,, *corymbosa*, 54, 71
Oleoxylon balsamiferum, 98
OLIGOCLASE, 162
Onychium auratum, 55, 82
OPHIDIIDÆ, 181
OPHIUROIDEA, 173
Oplismenus, 85
,, *Burmanni*, 55, 81
ORCHIDACEÆ, 76, 153, 155
Oroxylum indicum, 48, 55, 74
ORTHOCLASE, 162
OXALIDEÆ, 198
Oxalis, 198, 199
,, *corniculata*, 198
,, *pusilla*, 199
,, *repens*, 199
Pachira, 68
Pachychlamys, 109
Pachynocarpus, 89, 102, 135, 136
,, *Stapfianus*, 135, 136
,, *Wallichii*, 135
Pæderia fœtida, 49, 72
PALMEÆ, 77
PANDANACEÆ, 79
Pandanus, 45, 48, 53, 54, 56, 77
,, *odoratissimus*, 47, 48, 79
Paracyathus, 139
* ,, *cavatus*, 139, 149
,, *crassus*, 139
* ,, *fulvus*, 139, 149
,, *indicus* var. *gracilis*, 139
**Paracyathus*, *porphyreus*, 140 149
,, *pulchellus*, 140
Paramignya, 206, 223
,, *angulata*, 224
,, *armata*, 223
,, ,, var. *andamanica*, 223
,, *longispina*, 223, 224
,, *monophylla*, 224
Parashorea, 120
,, *stellata*, 120
Parinarium, 94
,, *dillenifolium*, 94
Parthenope, 177
,, *spinosissima*, 177
PARTHENOPIDÆ, 177
Pedicularis, 7
* ,, *diffusa*, 7, 9
* ,, *flaccida*, 8, 9
,, *flexuosa*, 8
,, *gracilis* var. *macrocarpa*, 8
,, *likiangensis*, 9
,, *lineata*, 9
,, *refracta*, 8, 9
,, *spicata*, 9
,, *szetschuanica*, 9
,, *verticillata*, 8, 9
PEDICULATI, 179
Peniophora papyrina, 83
Pentacme, 88, 107
* ,, *malayana*, 107
PENTAGONASTERIDÆ, 172
Petalandra, 126
,, *micrantha*, 126
Petrocarpa dillenifolia, 94
Phajus alba, 157
Phaseolus adenanthus, 48, 70
Phœnix paludosa, 158
Pholidota imbricata, 54, 77
Phos, 176
Phyllanthus reticulatus, 54, 75
Physalis, 85
,, *minima*, 55, 74
Physiculus, 180
* ,, *argyropastus*, 180
,, *roseus*, 180
PHYSOSTOMI, 182
Picea, 155
Picrasma, 226, 227
,, *andamanica*, 228
,, *javanica*, 227, 228
,, *nepalensis*, 228
Pierotia lucida, 191
Pierrea, 134
,, *penangiana*, 133 134
Pimela dichotoma, 243
,, *stricta*, 186
Pipturus velutinus, 50, 76
PISCES, 177
Pisonia aculleata, 48, 74
,, *alba*, 49, 74
,, *excelsa*, 49, 74

PLAGIOCLASE, 162, 165
Platynema laurifoliun, 193
Pleurotoma, 176
,, *atractoides*, 176
Pluchea indica, 47, 56, 72
Plumieria, 154
Pogonatherum, 85
,, *saccharoideum*, 55, 81
Pollia, 85
,, *Aclisia*, 50, 77
Polycyathus, 143
• ,, *andamanensis*, 143 149
Polypodium adnascens, 50, 82
,, *irioides*, 50, 82
,, *quercifolium*, 82
Polyporus australis, 83
,, *xanthopus*, 88
Pongamia glabra, 53, 70
Pothos scandens, 50, 81
Premna, 48, 49
,, *integrifolia*, 48, 50, 56, 74
Pseudarchaster, 171
,, *mosaicus*, 171
Psilotum triquetrum, 54, 81
Pteris biaurita, 55, 82
,, *longifolia*, 55, 82
PYROXENITE, 163
Quadrella, 177
,, *coronata*, 177
QUARTZ, 162, 164, 165, 166, 167
RANINIDÆ, 177
Raninoides, 177
,, *personatus*, 177
Retinodendron, 88, 102, 127, 135
,, *bancanum*, 129
• ,, *Kunstleri*, 127, 128, 129
,, *pallidium*, 128
,, *pauciflorum*, 127
,, *Rassak*, 127, 128
• ,, *Scortechinii*, 128
RHAMNEÆ, 69
Rhizotrochus, 170
• ,, *crateriformis*, 170
Rhodopsammia, 146
,, *carinata*, 146, 147
,, *socialis*, 147
RHYOLITE, 166
Rhytisma, 83
Richetia, 132
,, *penangiana*, 132
Rostellaria delicatula, 176
Roucheria, 189
,, *Griffithiana*, 190
RUBIACEÆ, 71, 84
RUTACEÆ, 68, 205
Ryssopteris elliptica, 197
Saccolabium, 157
Salmalia malabarica, 67
Santiria, 236, 237, 238, 252, 255, 259
,, *apiculata*, 253, 259
,, *conferta*, 253, 259, 261
Santiria, costata, 253, 260
,, *fasciculata*, 252, 255, 256, 261
• ,, *floribunda*, 252, 254
,, *Griffithii*, 252
,, *lævigata*, 253, 257
,, *laxa*, 252, 254
• ,, *longifolia*, 253, 258
• ,, *macrocarpa*, 253, 256
,, *Maingayi*, 258
,, *multiflora*, 254, 261
,, *oblongifolia*, 253, 257
,, *Planchoni*, 237, 238, 240
,, *puberula*, 253, 256
,, *tomentosa*, 262
• ,, *Wrayi*, 253, 259
SAPINDACEÆ, 69
Sapindus travancorensis, 246
SAPOTACEÆ, 72
SATYRIDÆ, 2, 3
SATYRINÆ, 6
Satyrus (Erites) medura, 3
Scævola Kœnigii, 47, 56, 72
Scirpearella, 171
SCITAMINEÆ, 77, 157
Sclerostylis macrophylla, 217
,, *pentaphylla*, 216
,, *Roxburghii*, 226
SCOPELIDÆ, 182
SCROPHULARINEÆ, 74
Selas lanceolatum, 215
Semecarpus heterophylla, 50, 55, 70
Shorea, 87, 88, 107, 115, 122, 123, 135
,, *acuminata*, 108, 113
,, *astrosticta*, 110
,, *auriculata*, 114
,, *brachyptera*, 123
,, *bracteolata*, 109, 117
• ,, *ciliata*, 109, 118, 120
• ,, *costata*, 109, 119
,, *Curtisii*, 108, 111
,, *disticha*, 113
,, *eximia*, 109, 121, 135
,, *foveolata*, 117
• ,, *glauca*, 109, 117
,, *gratissima*, 108, 115
,, *Hemsleyana*, 135
• ,, *Kunstleri*, 109, 116
,, *lacunosa*, 112
,, *leprosula*, 108, 110, 135
,, *macroptera*, 108, 113
,, *maranti*, 109, 120
,, *Martiniana*, 123
• ,, *Maxwelliana*, 108, 109, 114, 116,
,, *parviflora*, 125
,, *parvifolia*, 108, 112, 126
• ,, *pauciflora*, 109, 116,
,, *pinangiana*, 105
• ,, *Ridleyana*, 109, 115
,, *scaberrima*, 123
• ,, *scutulata*, 108, 110
,, *sericea*, 108, 111

Shorea, stenoptera, 123
,, *sub-lacunosa*, 121
,, *Talura*, 101
* ,, *Thiseltoni*, 110, 122
* ,, *utilis*, 109, 119
Sideroxylon ferrugineum, 72
Sigaretus, 176
SIMARUBEÆ, 226
SOLANACEÆ, 74
Solenocera Hextii, 176
Sonneratia acida, 158
,, *apetala*, 158
SPATANGIDÆ, 174
SPATANGOIDA, 173
SPHENOPIDÆ, 151, 152
Sphenopus, 152
,, *arenaceus*, 152
,, ,, var. *barnettii*, 152
,, *marsupialis*, 152
,, *pedunculatus*, 152
Spongodes, 171
SPURGE, 157
STACHYDEÆ, 35
Stemoporus Wightii, 127
Sterculia rubiginosa, 47, 56
,, ,, var. *glabrescens*, 68
STERCULIACEÆ, 68
Strychnos acuminata, 50, 73
Synaptea, 100, 101, 102, 135
,, *Dyeri*, 106
,, *faginea*, 105
,, *grandiflora*, 101
,, *odorata*, 101
Tellina, 176
,, *Murrayi*, 176
Terminalia Catappa, 47, 49, 55, 56, 70
Tetractomia, 205, 211
,, *majus*, 211
,, *Roxburghii*, 211, 212
Tetramerista, 231, 233
,, *glabra*, 233
,, *paniculata*, 212
Thelephora incrustans, 83
Thespesia populnea, 47, 49, 65
Thysanolæna, 85
,, *acarifera*, 47, 181
TILIACEÆ, 68
Toddalia mitis, 214
TRACHINIDÆ, 177
TRACHININA, 177
TRAPEZIIDÆ, 177
Trema amboinensis, 50, 54, 55, 75
Trichilia spinosa, 225
Trichomanes, 47, 84
,, *pyxidiferum* 50, 81
Trichosanthes palmata, 50, 71
Trigonochlamys, 236, 237, 238, 251
,, *Griffithii*, 251
Triomma, 235, 236
,, *malaccensis*, 236
,, 206, 221
Triphasia, aurantiola, 221
,, *sarmentosa*, 222, 223
,, *trifoliata*, 221
Tristellateia, 192, 193
,, *australasica*, 193
TURBINOLIDÆ, 138, 170
Turræa virens, 225
Tylophora, 49
,, *globifera*, 49, 73
Tytonia natans, 204
URTICACEÆ, 75 84
Vanda, 157
Vandellia, 85
,, *crustacea*, 54, 55, 74
Vateria, 127
,, *Ceylonica*, 127
,, *indica*, 127
,, *lanceæfolia*, 127, 128
,, *Roxburghiana*, 101, 127
Vatica, 88, 100, 101, 102, 104, 106, 122
127, 135
,, *bancana*, 129
,, *bantamensis*, 103
,, *chinensis*, 101
* *Vatica cinerea*, 102, 104
,, *Curtisii*, 102, 105
,, *Dyeri*, 102, 106
,, *eximia*, 121
,, *faginea*, 102, 105
,, *grandiflora*, 101
,, *laccifera*, 101
,, *lanceæfolia*, 128
* ,, *Lowii*, 102, 103
,, *Maingayi*, 102, 103, 104
* ,, *nitens*, 104
,, *nitida*, 102
,, *pallida*, 128
* ,, *perakensis*, 102, 103
* ,, *reticulata*, 103, 106
,, *Roxburghiana*, 101
,, *ruminata*, 136
,, *scaphula*, 127
,, *sub-lacunosa*, 121
,, *verrucosa*, 136
,, *Wallichii*, 136
VERBENACEÆ, 74
Vernonia divergens, 47, 72
VERTICILLATÆ, 9
Vigna lutea, 48, 70
VIOLARIEÆ, 65
Vitis carnosa, 69
,, *lanceolaria*, 48, 69
,, *repens*, 55, 69
Wedelia scandens, 47, 56, 72
Xanthoxylon nilagiricum, 208
,, *Roxburghianum*, 208
,, *triphyllum*, 208
,, *zeylanicum*, 208
Ximenia lanceolata, 215
Zanthoxylum, 205, 213, 214
,, *glandulosum*, 214

Zanthoxylum, *longifolium*, 214
  ,, *lucidum*, 214
  ,, *myriacanthum*, 213, 214
  ,, *ovalifolium*, 213
  ,, *Rumphianum*, 207
  ,, *undulatum*, 214
ZOANTHEÆ, 151

ZOANTHIDÆ, 151, 152
Zoanthus, 152
  ,, *confertus*, 152
  ,, *solanderi*, 152
Zoroaster alfredi, 173
  ,, *barathri*, 173
ZOROASTERIDÆ, 173

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Part II.—NATURAL SCIENCE.

No. I.—1893.

I.—*On* Erites, *an oriental genus of satyrid butterflies*:—*By* Lionel de Nicéville, F. E. S., C. M. Z. S.

[Received 16th February;—Read 1st March, 1893.]

The genus *Erites* at the present date contains five species only, (six if *E. ochreana* is held to be a distinct species, I have not seen it), found in Assam, Burma, the Malay Peninsula, Sumatra, Java, Labuan, Borneo, and the Philippines. To these I now propose to add a sixth. All are closely allied, and very similar in general aspect. They are extremely delicate butterflies, semi-transparent, of a brownish-ochreous shade, sometimes just tinted with violaceous on the upperside. All possess a submarginal series of ocelli to both wings, more or less visible on the upperside. These ocelli vary greatly in size, in some species they are large and prominent, in others quite small and inconspicuous. On the underside there are usually two discal bands, often more or less angled. These butterflies are found only in virgin forests as far as I am aware, and fly weakly close to the ground amongst the brushwood under the great trees and in open paths through the forests. Their transformations are unknown. The males have no secondary sexual characters. The females differ only from the males in the wings being somewhat broader, and in having the apex of the forewing more rounded.

I give below a key by which the several species may be distinguished :—

Key to the species of *Erites*.

A. Forewing with five equal-sized ocelli.
  1. *E. elegans*, Borneo.

B. Forewing with the posterior ocellus very much larger than the others.
  a. Forewing with the large ocellus on the upperside prominently pupilled with white. The apex of the wing falcate.
  2. *E. falcipennis*, Assam; Burma.
  b. Forewing with the large ocellus on the upperside blind or nearly so. The apex of the wing rounded.
    ^{1}. Both wings with all the ocelli prominent and well-formed on the underside.
      a^2. Forewing with three small apical ocelli only in addition to the large anal one.
  3. *E. medura*, Java; Philippines.
      b^2. Forewing with four apical ocelli in addition to the large anal one.
        a^3. The inner discal band on the hindwing straight.
  4. *E. argentina*, Labuan; Borneo; Malacca.
        b^3. The inner discal band on the hindwing highly angled outwards in the middle.
  5. *E. angularis*, Burma; Malay Peninsula; Sumatra.
    b^1. Both wings with all the ocelli inconspicuous except the anal one in the forewing, reduced to black dots only.
  6. *E. rotundata*, Burma.

1. ERITES ELEGANS, Butler.

E. elegans, Butler, Cat. Diurn. Lep. B. M., *Satyridæ*, p. 147, n. 2, pl. ii, fig. 4, *female* (1868); id., Druce, Proc. Zool. Soc. Lond., 1873, p. 310, n. 2; id., Staudinger, Ex. Schmett., p. 230, pl. lxxxii, *male* (1887).

HABITAT: Borneo (*Butler, British Museum; Druce; Staudinger*); three males Borneo, one female Padas River, North Borneo (*collection de Nicéville*).

2. ERITES FALCIPENNIS, W.-M. and de N.

E. falcipennis, Wood-Mason and de Nicéville, Butt. of India, vol. i, p. 237, n. 230 (1883); idem, id., Journ. A. S. B., vol. lv, pt. 2, p. 351, n. 30, pl. xvi, fig. 2, *male* (1887).

HABITAT: One male Silcuri, August; one male, Nemotha, September—both in Cachar, Assam (*Wood-Mason, collection Indian Museum*); one male, Fort Lungleh, Lushai Hills, October, 1890 (*R. Pughe, collection de Nicéville*); one female, Karen Hills, Burma, April (*collection Phayre Museum, Rangoon*).

3. ERITES MEDURA, Horsfield.

Hipparchia medura, Horsfield, Cat. Lep. Mus. E. I. C., pl. v, figs. 8, 8*a*, *female* (1829); *Erites medura*, Marshall and de Nicéville, Butt. of India, vol. i, p. 236 (1883); id., Pagenstecher, Jahr. des Nass. Vereins fur Natur., vol. xliii, p. 96, n. 15 (1890); *E. medura*, var. *ochreana*, Staudinger, Iris, vol. ii, p. 38 (1889); *E. ochreana*, Semper, Schmett. Philipp. Inseln, p. 326, n. 497 (1892); *Satyrus* (*Erites*) *madura* (*sic*), Westwood, Gen. Diurn. Lep., vol. ii, p. 392, n. 47 (1851); *Erites madura*, Horsfield and Moore, Cat. Lep. Mus. E. I. C., vol. i, p. 229, n. 484 (1857); id., Hewitson, Journ. Linn. Soc. Lond., Zoology, vol. viii, p. 145 (1865); id., Butler, Cat. Diurn. Lep. B. M., *Satyridæ*, p. 146, n. 1 (1868).

HABITAT: Java (*one female, Horsfield collection in the British Museum*); East Java (*Pagenstecher*); Palawan, Philippines *Staudinger*).

Mr. Hewitson (l. c.) describes a variety of this species as follows:—"*Male* and *female*. With five ocelli on the anterior wing, one large and four small. Sumatra; Singapore." This almost certainly equals *E. angularis*, Moore, which undoubtedly occurs in the Malay Peninsula, and also in Sumatra, as Dr. L. Martin, of Deli, Sumatra, informs me.

Mr. Hewitson also describes another variety thus:—"*Male* and *female*. With the five ocelli of the anterior wing small and of equal size, Singapore; Sarawak." This can only refer to *E elegans*, which certainly occurs in Borneo, but very doubtfully in Singapore, at any rate it is not recorded from thence by Mr. Distant in "Rhopalocera Malayana," nor have I seen a specimen from any part of the Malay Peninsula.

4. ERITES ARGENTINA, Butler.

E. argentina, Butler, Cat. Diurn. Lep. B. M., *Satyridæ*, p. 188, n. 5, pl. v, fig. 8, *female* (1868); id., Druce, Proc. Zool. Soc. Lond., 1873, p. 340, n. 1; id., Distant, Ann. and Mag. of Nat. Hist., fifth series, vol. xix, p. 48, n. 21 (1887).

HABITAT: Labuan, an island off the N.-W. coast of Borneo (*Butler, in coll. British Museum*); Borneo (*Druce* and *Distant*); Borneo; Malacca (*Staudinger*); S.-E. Borneo (*collection de Nicéville*).

Unfortunately I possess no specimen of *E. medura*; but comparing the figures of *E. medura* and *E. argentina*, both taken from female specimens, and a single male of the latter in my collection, the only point of difference I can discover between them is that *E. medura* lacks a small ocellus in the second median interspace of the forewing which is present in *E. argentina*.

5. ERITES ANGULARIS, Moore.

E. angularis, Moore, Proc. Zool. Soc. Lond., 1878, p. 825; id., Distant, Rhop. Malay., p. 46, n. 1, pl. v, fig. 3, *male* (1882); id., Marshall and de Nicéville, Butt. of India, vol. i, p. 236, n. 229, pl. xvi, fig. 50, *female* (1883).

HABITAT: Taoo plateau, 3,000—5,000 feet, Upper Tenasserim

(*Moore*); Perak (*Distant*); Meplay Valley, January; Thoungyeen forests, March; near Moulmein, October (*Marshall* and *de Nicéville*); Yoonzaleen Valley, November; Myitta, January, both in Burma; Rawan, Selangor, Malay Peninsula, December (*collection de Nicéville*).

In this species there are four small equal-sized ocelli and one large ocellus to the forewing, the ocelli of the hindwing prominent; the inner band of the hindwing strongly outwardly angled in the middle; the outer band is twice outwardly angled, once in the middle, and once where it is crossed by the second subcostal nervule, this feature being only found in the otherwise quite distinct species, *E. elegans.*

6. ERITES ROTUNDATA, n. sp.

E angularis, Watson (*nec* Moore), Journ. Bomb. Nat. Hist. Soc., vol. iii, p. 19, n. 38 (1888).

HABITAT: Burma.

EXPANSE: ♂, 2·0 to 2·1; ♀, 2·2 to 2·4 inches.

DESCRIPTION: MALE. UPPERSIDE, *both wings* semi-transparent, brownish-ochreous. *Forewing* with the two discal bands of the underside showing through by transparency; a large, almost round (slightly oval) black ocellus in the first median interspace and extending slightly into the two interspaces beyond, obscurely pupilled with plumbeous, and surrounded with an ochreous ring. *Hindwing* with a prominent discal ochreous band, outwardly angled in the middle; four large round blind black ocelli, surrounded each by a very wide ochreous ring, the rings touching, thus forming a continuous band, one ocellus in each interspace from the first median to the second subcostal nervule; two fine ochreous and two fine fuscous marginal lines. UNDERSIDE, *both wings* finely striated with purplish-fuscous; the four apical ocelli present in the forewing of *E. angularis*, Moore and the five of the hindwing reduced to minute black dots in this species. *Forewing* with the fifth large ocellus much as above, but the black portion is smaller, the ochreous ring wider, and the pupil prominent and silvery; two prominent discal deep ochreous bands outwardly sharply defined by a black thread commencing close to the submedian nervure, the inner band straight, crossing the discoidal cell obliquely about its middle, and becoming lost before reaching the subcostal nervure; the outer band curved and bounding the wide ochreous outer ring of the large ocellus in the first median interspace, the band ending on the third median nervule. *Hindwing* with faint traces of two discal bands, the inner one straight, the outer one angled outwardly once only, as in all the species of the genus except *E. angularis*; the marginal lines as on the upperside. FEMALE hardly differs from the male, except that the wings are broader, the apex of the forewing is more rounded, and the forewing has similar fine marginal lines as are found in the hindwing of the male. This species differs structurally from *E. angularis* in that the tooth or angulation at the termination of the second median nervule of the hindwing is as great or greater than that at the third; in *E. angularis* this tooth is quite small.

In one specimen in my collection from the Pegu Yoma, taken in December, the markings are almost as prominent on the underside as in *E. angularis*, there are two apical well-formed ocelli to the forewing, and five ocelli to the hindwing, the discal bands well-marked, but as the inner band of the hindwing is straight (not outwardly strongly angled in the middle), and the outer band is once outwardly angled only (instead of twice), I have no hesitation in placing this specimen under *E rotundata* rather than under *E. angularis.* Another specimen in my collection taken at the same place and time is quite typical *E. rotundata.*

In the Proceedings of the Zoological Society of London for 1891, page 268, Mr. H. J. Elwes records *E. medura*, Horsfield, from East Pegu, Upper Burma, and places *E. angularis*, Moore, with a query as a synonym of that species, and makes the following remarks :—

"Numerous specimens were sent by Doherty from East Pegu, taken at about 1,500 feet [during March and April], of which several females and one male were by him supposed to be, and marked as, a distinct species. These correspond to the female taken in the Thoungyeen forests by Major Bingham, and described by Marshall and de Nicéville, 'Butt. of India,' vol. i, p. 237,* as nearer to *E. medura* of Java than to *E. angularis.*"

"After examining the series closely and comparing them with one Javan specimen, I do not see how to separate the two species [*E. medura*, Horsfield, and *E. angularis*, Moore], for, though in the supposed new species the ocelli on the upperside of the hindwing are much larger than in the other form from the same locality, whilst on the underside both the ocelli and the bands are almost obsolete, I am rather inclined to suspect seasonal dimorphism, and to think that this form is the last of the first brood, and the others, among which males are far more numerous, are the first of a second brood. In the Javan specimen we have the hindwing like one form below and the other above. Further observations are requisite to decide the question."

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* "A female taken in the Thoungyeen forests in March differs from our other female specimens in the ocellus on the upperside of the *forewing* being very nearly round, not oval, with a distinct yellow iris of equal width throughout; the outer fascia of the *hindwing* much broader and very distinct; four large black spots beyond twice the size of those in the other specimens, the yellow irides prominent and touching. On the underside of the *hindwing* the two discal fasciæ have almost disappeared, and the five submarginal ocelli are very minute. This specimen differs only in the following particulars from Horsfield's figure of *E. medura* : The outer margin of the forewing is not quite so evenly rounded, being in fact slightly concave; the large ocellus is not quite so large as in *E. medura*, and the iris is less wide. On the underside the apical ocelli on the forewing are smaller, and on the hindwing the ocelli are minute, and the fasciæ are obsolete. This specimen, however, is much nearer *E. medura* than *E. angularis.*" (*Marshall* and *de Nicéville*, l. c.)

E. medura and *E. angularis* are abundantly distinct. The former has three apical ocelli in the forewing, the inner discal band straight, the outer band apparently once outwardly angled in the hindwing; while the latter has four apical ocelli, the inner band outwardly angled in the middle, the outer band twice outwardly angled.

Mr. Elwes suggests that seasonal dimorphism may occur in the genus. At present I see no indications of the appearance of this phenomenon, at any rate if the usual form of seasonal dimorphism observable in the *Satyrinæ* is understood. I possess the strongly ocellated *E. undularis* taken in January, October, November, and December, all of which months (except occasionally October) are dry months, when the ocelli should be obsolete: while the two type specimens of *E. falcipennis* were taken in the height of the rainy season, August and September, but have minute ocelli, instead of the normal rainy-seasonal large and well-developed ocelli. I append a note by Mr. W. Doherty on the subject, which bears out my opinion, and I may add that it is at his suggestion that I have described *E. rotundata*.

"The prehensors of *Erites* are slender and simple, and of the usual satyrid type, resembling those of most of the species of *Lethe* (*Debis*), to which the genus seems allied, the true *Lethe* (*europa*, Fabricius) being exceptional in having the upper organ without branches. Seen from the side, the upper organ (uncus, tegumen) of *E. angularis* is unusually straight; that of *E. rotundata* is much more depressed terminally. In both species the lower organ (clasp, harpago) is truncate at the tip, but in *E. angularis* it is cut square, while in *E. rotundata* the end is concave, so as to form a distinct scallop."

"Apart from these differences in the prehensors, I think Mr. Elwes' supposition, that *E. rotundata* may be the dry-season form of *E. angularis*, an unlikely one. No seasonal variation has yet been observed in the genus. I found *E. angularis*, which should be the wet-season form, commoner in the dry-season than *E. rotundata*. Finally, the dimorphism, if it exists, must be of a new type. Dry-season forms are distinguished by obliterated ocelli and angular wings, but here the non-ocellate form has the wings abnormally rounded."

I possess the following examples of *E. rotundata.* One male and one female from Beeling, Upper Burma, taken on 27th March, 1886, two males on the 29th idem, one female on the 14th April, by Lieut. E. Y. Watson; two males taken in the Pegu Yoma, Burma, by a native collector employed by the Phayre Museum, Rangoon, in December; one female from Quaymoo, Tenasserim, captured in March and another in November, in the Yoonzaleen Valley, also in Tenasserim by Major C. T. Bingham.

Two species of Pedicularis.—*By* D. Prain.

(With Plates I and II.)

[Received March 9th—Read April 5th.]

In 1889 (*Journ. As. Soc. Beng.* lviii pt. 2, p. 255) the writer had the honour to communicate to the Society descriptions of a number of new Indian species of this genus. Since then a considerable number of new species have been reported from China and Tibet and have been described in various periodicals by Messrs Maximowic, Hemsley and Franchet, and by the writer. Now, another new Indian species has been reported; of this a description is given below and the present opportunity is taken of describing an allied new species from Szechuen.

1. Pedicularis diffusa Prain, *sp. nov.* (Pl. I.)

Elata simplex vel e collo diffuse ramosa, radice debili ramosa collo esquamato, caulibus gracilibus simplicibus, *foliis* radicalibus longe petiolatis mox evanescentibus caulinis 4-natim verticillatis laminis glabrescentibus ovato-oblongis pinnatisectis, segmentis 5–8-jugis oblongis obtusis inciso-serratis; *floribus* verticillatis verticillis numerosis inter se remotis, bracteis foliaceis oblongo-ovatis petiolatis pinnatifidis et inciso-serratis; *calycis* breve pedicellati campanulati membranacei inflati totius reticulati antice vix fissi dentibus majusculis inaequilatis anticis et lateralibus ovatis inciso-serratis illis duplo his 4-plo summo deltoideo integro latioribus; *corollae* roseae tubo sursum ampliato calyce duplo longiore basi infracto, labio 3-lobo lobis oblongo-ovatis margine sinuatis lateralibus medio dimidio majoribus, galea leviter arcuata tubo subcontinua apice subincurva erostri; *staminibus* ex adverso summi ovarii insertis filamentis anticis superne hirsutis; *ovario* ovoideo stigmate parum exserto, *capsula* anguste lanceolata apice acuta calyce duplo longiore, seminibus ovoideis testa nigrescente minute reticulatis.

In HIMALAYA ORIENTALI: Sikkim, Mt. Tankra, 11,500 p. s. m.; *G. A. Gammie!*

Caulibus 40–60 cm. longis, foliis caulinis 2–2·5 cm. longis his 0·75–1 cm. latis, segmentis 5 mm. longis 3 mm. latis, petiolis 0·5–1 cm. longis; calyce 6 mm. longo hoc 3·5 mm. lato; corollae tubo 10 mm. longo apice 4 mm. lato, galea 5 mm. longa, labio 8 mm. lato; capsula 12 mm. longa 5 mm. lata.

This species is most nearly related to *P. verticillata* Linn. and *P. refracta* Maxim. but besides differing greatly in habit and foliage from both it differs from *P. verticillata* in having a calyx with large teeth and with a tube reticulated throughout, while it differs from *P. refracta* in having the anterior and lateral calyx teeth serrate and not entire; from both it differs in having acute, not muticous, anther-cells.

Of Indian species, it in habit much resembles *P. flexuosa* Hook. f., though it is glabrescent while that species is hirsute, but the plant that it imitates most closely is *P. gracilis* Wall. VAR. *macrocarpa* Prain, the likeness being so great that though in flower they differ so widely, it is not easy to distinguish fruiting specimens of the two.

2. PEDICULARIS FLACCIDA Prain; *sp. nov.* (Pl. II.).

Ascendens glabra caulibus gracilibus corymbosim ramosis, *foliis* ramisque 3–4-natim verticillatis radicalibus mox evanescentibus caulinis breve petiolatis ovatis pinnatifidis segmentis 5–6-jugis obtusis inciso-serratis; *floribus* in verticillis 4-floris paucis remotisque dispositis, bracteis foliaceis calycem excedentibus; *calycis* glaberrimi parvuli campanulati antice parum fissi 5-dentati segmentis omnibus oblongis integris tubo costato nec reticulato; *corollae* tubo sursum ampliato calycem 3-plo excedente basi infracto, labio 3-lobo lobis lateralibus ovatis medio orbiculato basi constricto 3-plo majoribus, galea leviter arcuata tubo subcontinua apice subincurva erostri, *staminibus* ex adverso medii ovarii insertis omnibus glabris, antheris contiguis muticis; *ovario* ovoideo stigmate exserto.

In CHINA OCCIDENTALI; Szechuen occident. prope Tachienlu, *Pratt* n. 471!

Caulibus 20–25 cm. longis foliis caulinis 1 cm. longis his 0·7 cm. latis segmentis 2 mm. longis 1 mm. latis, petiolis 0·5 cm. longis; calyce 2·5 mm. longo hoc 2 mm. lato; corollae tubo 8 mm. longo apice 4·5 mm. lato, galea 4 mm. longa, labio 7 mm. lato.

Like the preceding species this is also closely related to *P. verticillata* Linn. but differs considerably in habit, and though it has the calyx tube ribbed and not reticulated just as *P. verticillata* has, it differs in having the calyx distinctly toothed and extremely small. The stamens also differ in being all glabrous whereas in *P. verticillata* the anterior

VERTICILLATAE.

Galea less than half the length of the lip :—
Bracts flabellate, spike long, dense; calyx small, subglobose, not cleft, teeth small, entire; anterior filaments hairy ... *P. spicata.*
Bracts oblong or linear, spike short; calyx large cvate, teeth large :—
Calyx not cleft, teeth crested except the upper; filaments not hairy ... *P. lineata.*
Calyx cleft, feeth all entire; anterior filaments hairy ... ... *P. likiangensis.*
Galea about equal in length to the lip :—
Calyx-tube not net-veined between the ribs :—
Calyx cleft, hardly toothed; anthers discrete, anterior filaments hairy ... *P. verticillata.*
Calyx not cleft, distinctly toothed; anthers contiguous, filaments not hairy ... *P. flaccida.*
Calyx-tube net-veined between the ribs :—
Calyx hardly cleft, teeth crested except the upper; anterior filaments hairy... *P. diffusa.*
Calyx distinctly cleft, teeth entire :—
Margin of galea even; anterior filaments hairy ... ... *P. refracta.*
Margin of galea-toothed; filaments not hairy ... ... *P. szetschuanica.*

Explanation of the Plates.

PLATE I. Pedicularis diffusa *Prain.*

1, Flower with bract; 2, calyx with ovary and style; 3, half of corolla showing staminal insertion; 4, stamens; 5, capsule; 6 seed: 1, 2, 3 *and* 5 *magnified* $\frac{3}{1}$; 4 *and* 6 *magnified* $\frac{4}{1}$.

PLATE II. Pedicularis flaccida *Prain.*

1, Flower with bract; 2, calyx with ovary and style; 3, half of corolla showing staminal insertion: *all magnified* $\frac{3}{1}$.

Some Observations of the Electrical action of Light upon Silver and its Haloid Compounds :—By Colonel J. WATERHOUSE, I. S. C., *Assistant Surveyor General of India.*

[Received April 20th : Read May 3rd.]

In my paper on "Electro-chemical Reversals with Thio-carbamides," read at the meeting of the Society in April 1891, it was shown that the peculiar reversals of the photographic image produced by the addition of very minute quantities of a thio-carbamide, or sulpho-urea, to an eikonogen developer appeared to be connected with and accompanied by electro-chemical action, if not actually brought about by it. It was remarked also that the experiments brought forward pointed to the conclusion that, at any rate as regards the haloid salts of silver, the formation and development of the photographic image is to a very great extent influenced by electrical action, more so perhaps than has generally been recognised, although the fact of photographic action being accompanied by electrical phenomena has been known since the earliest days of photography. It was suggested that a further investigation into the theory of photography based on electro-chemical laws, might be of value in throwing light upon much that is now obscure and uncertain as regards the formation and development of the invisible photographic image formed by the exposure to light of silver haloid compounds.

Since that time I have given a good deal of attention to the subject and tried several experiments in various ways with the object of ascertaining the electrical action of light, in connection with photography, on plates of pure silver immersed in various fluids as well as on dry plates and other forms of silver haloid compounds in ordinary photographic use. Also on the action of electrical currents in forming developable compounds of silver haloids similar to those formed by light, and, further, on the electrolysis of ordinary photographic developers and on the currents produced during the development of the photographic image. These observations are not yet sufficiently complete to found any sound deductions upon, but I hope to complete them later. In the meantime, I have thought that a short note on some observations I have lately made on the electrical action of light upon plain silver plates in various solutions, might be of interest and form a suitable introduction to any further notes on this subject I may be able to bring before you. It does not pretend to be complete or exhaustive, and can only be considered as a contribution towards a systematic investigation of the question.

A great many observations have been made from time to time of the electrical influence of light on metals immersed in water and various saline solutions, and before going further, it seems desirable to give a brief summary of these observations, and more particularly of those relating to silver and its salts.

More than half a century ago, in 1839, Edmond Becquerel was the first to show that the electrical action accompanying the chemical changes brought about by the influence of light upon various substances, including several metals and the silver haloids, could be observed with the aid of a very delicate galvanometer. He found that this action was quite independent of any calorific radiation or heating of one electrode more than another, but was powerfully affected by the different rays of the spectrum, the greatest action being produced by the violet, indigo and blue rays, while with the green, yellow and red rays there was little or no action. Becquerel's observations are fully summarized in his work, "*La Lumière, ses causes et ses effets*," Vol. II. To observe these effects he used a covered vessel divided into two parts by a thin membrane. In each of the compartments he placed a plate of platinum or gold, previously made red-hot to remove all impurities, the plates being connected with the poles of a very sensitive galvanometer, and laid horizontally in the apparatus. Each compartment had a moveable cover. He found that when the two compartments contained an alkaline solution, the plate exposed to the solar rays took negative electricity, while the reverse occurred if the solution were acid. With alterable metals, such as silver or brass, analogous effects were obtained and the electrical effect could be largely increased by giving the plates a preliminary polarisation by plunging them in water and then placing them in connection with the positive pole of a battery. When two silver plates were immersed in water acidulated with nitric acid exposure to light of one plate only produced a very weak current and the exposed plate was always positive. If the gold or platinum plates had been thoroughly cleaned, had remained in strong nitric acid and had been made red hot, the different parts of the spectrum were almost powerless to produce electric currents. With well cleaned silver plates which had been heated several times the effects were also almost *nil*, though not quite absent, and from this fact it seemed possible that when the plates were not in this state the effects produced might be due to the action of light upon corpuscles of organic matter adhering to the plates which become oxidised by the action of light, the water supplying the oxygen. If this effect did not take place and there was no alteration in the plates themselves the light must produce a disturbance of the particles, but the former supposition seemed most probable. He found that when silver chloride, iodide or bromide, precipitated in a thin layer on sheets of platinum or gold, was exposed to light as above, the exposed plate was positive, and that the initial action was much stronger with the bromide than with the chloride; though the intensity of the currents observed was variable and depended on the thickness of the film of bromide, moreover the electrical action was soon exhausted. With the iodide the current was almost as strong as with the chloride, but did not remain constant so long.

When plates of silver were employed, instead of platinum or gold, as a support for the haloids, the effects noted were stronger and more regular, but it was found that the direction of the current depended on the thickness of the films; with thin coatings the exposed plate was positive, and with thick coatings negative. This was markedly the case with plates of silver exposed to the vapours of iodine. With vapour of bromine the exposed silver plate was negative, the initial current, even with diffused light, was very strong, but after remaining exposed to light for some minutes then protected from light and again exposed to its influence, it was found that the current was very weak. A film of silver chloride prepared by exposing a silver plate to the vapour of chlorine gave only a very weak effect, but plates coated with the violet subchloride behaved very well in these trials and yielded for a long time results from which comparisons could be made.

On the basis of these experiments Becquerel invented his electrochemical actinometer which was practically a voltaic element or cell composed of two plates of very pure silver coated usually with the violet subchloride of silver and plunged into a conducting fluid composed of two parts of monohydrated sulphuric acid in 100 parts of water. The apparatus was so arranged that all light was excluded, except from an adjustable opening on one side by which one of the plates could be exposed to light while the other remained in darkness.

When diffused daylight or sunshine acted upon one of the plates, more or less deviation of the needle was observed which remained constant so long as the light remained of the same intensity and the surface was sufficiently sensitive. If the light was shut off, the needle returned to zero or somewhat beyond it, but soon regained its original position. If the light remained of the same intensity and the plate was again exposed, the electrical effect was the same as before, always provided that the sensibility of the plate remained the same, for which purpose the sensitive coating should be sufficiently thick. Under favourable conditions the sensibility of the instrument might be preserved for a whole day and thus several consecutive observations might be made.

The deflections of the needle could not, however, be considered as proportional to the intensity of the chemical action exerted on the substance and consequently to the active luminous intensity; they only shewed whether this luminous intensity was greater or less in one circumstance or in another.

With this instrument Becquerel observed the effect of different rays of the spectrum on silver iodide and violet subchloride, and found that in both cases the maximum of action was in the green about D $\frac{2}{3}$ E; but while with the chloride the action decreased on both sides of this point, and ceased at A and H, with the iodide that had already been exposed there was a second maximum in the indigo blue about G $\frac{2}{5}$ H, and thence the action decreased to P in the ultra-violet. In neither case was any reversed action observed in the red rays, as observed with sensitive papers, but that might be due to the fact that in one case the sensitive surface was in water and in the other in air. Becquerel has not recorded any corresponding observations with silver bromide.

About 1840, Robert Hunt repeated Becquerel's experiments with many modifications, and the results he obtained (*Phil. Mag.*, XVI, 1840), completely confirmed them. More careful trials with the spectrum on plates of different metals made later showed that every ray of the spectrum produces an electrical disturbance. The rays, however, at the least refrangible end, produce a deflection of the needle in one direction, whilst the most refrangible rays set up a disturbance in an opposite direction. There are many indications of a condition analogous to polarity in the action of the prismatic rays. (*Researches on Light*, p. 295.) Hunt also remarks that "This action is only to be regarded as one of the evidences of chemical disturbance, exciting electrical currents; yet at the same time, it opens the question of the identity of the agent producing this disturbance and electricity."

In 1858, Grove (*Phil. Mag.*, XVI., (4), p. 426.) recorded that he had succeeded in obtaining a deflection of the galvanometer needle by allowing a beam of light suddenly to impinge on a daguerreotype plate in a trough of water, the plate being connected with one pole of the galvanometer and a gridiron of silver wire in front of the plate with the other. In experiments with platinum plates he came to the conclusion that the action of light was always in the direction of the polarisation current, though further experiments by Becquerel and others have shown that this is not the case..

In 1863, Pacinotti found that when pairs of plates of copper, zinc, iron or lead were immersed in solutions of certain salts of the same metals, the exposed plate was always negative, but with plates of silver immersed in a solution of nitrate of silver the plate exposed to sunshine was positive, whereas if exposed to the rays of a petroleum lamp, or of a heated thick iron plate it was negative, as were also the other metals. (*Cimento*, XVIII, p. 363.)

In 1875, Hankel published a series of observations on this subject (*Wied. Ann.*, I, 1877) in which he showed that the electrical behaviour of the metals under the influence of light depended very much on the condition of their surfaces; consequently, in such observations it is necessary to consider separately each state of surface. His observations were made on copper in different states, tin, brass, zinc, platinum and silver. With regard to the latter, he records that when two plates of fairly pure silver were immersed in filtered tap water, the plate exposed to the light of white clouds was negative. When the plates had been left a day in the water the rays of the setting sun still gave a pretty strong negative impulsion. Platinum plates coated with silver were slightly positive with white or blue light, while red light produced no effect. Silver plates coated with platinum, (old platinised silver battery plates) which were slightly negative when coupled in circuit with plain platinum, were found to be very sensitive to light, and the exposed plate was positive. With coloured glasses the action was strongest under blue glass, but was also quite strong under yellow and red glasses; gaslight also produced a pretty strong deviations of the galvanometer needle, and it was found that the action under dark red and blue glasses was stronger than under a light green which was much more transparent.

In 1878, Professor Dewar published a preliminary note on "Experiments in electric photometry," (*Proc. Roy. Soc.*, XXVII, 1878, p. 364) in which he dealt principally with the construction of the best form of cell for the general investigation of the electrical actions induced by light on fluid substances. He found that the list of substances that may be proved to undergo chemical decomposition by light, was very extensive, some of the most active being the ferro- and ferri-cyanides of potassium and the nitroprusside of sodium, tartrate of uranium and a mixture of selenious and sulphurous acids in presence of hydrochloric acid. The complete paper does not appear to have been published.

In 1876, M. Egoroff published a note (*Comptes Rendus, Acad. Franc.*, LXXXII, 1876) on a differential electro-actinometer for the purpose of determining the absorption of the ultra-violet rays by different media. The instrument consisted of two of Becquerel's electro-actinometers placed one above the other and arranged so that the current of one might be neutralised by the other. In some preliminary observations with iodised silver plates he found that the intensity of the current was proportional to the width of the opening through which light was admitted. It was also inversely proportional to the square of the distance of the source of light from the apparatus. An oil lamp was used. The instrument appeared to show an exact proportionality between the intensity of the light and that of the current, and its great sensitiveness and precision would enable it to be used as a very delicate photometer. In these experiments he found that the electromotive force exerted by the November sun upon iodised silver plates through an opening 30 mm. wide was $\frac{1}{15}$ of a Daniell cell; with a petroleum lamp, at 8 inches distance, it was only 0·004 Daniell.

Dr. J. Moser afterwards, in 1887, in working on Egoroff's plan found that the photo-electric current might be greatly increased by treating the chlorised, iodised or bromised silver plates with solutions of erythrosin, benzo-purpurin and other dyes, and in sunlight he observed currents of a strength equal to half a volt (Eder's *Jahrbuch der Photographie, &c.*, 1888, p. 297.)

At the meeting of the British Association, in 1880, Professor G. M. Minchin gave an account of his experiments on the generation of electric currents by the action of light on silver plates which were coated with emulsions of bromide, chloride, iodide and other salts of silver in gelatine and collodion, as well as with eosine, fluorescine and various aniline dyes, the object of these experiments being the solution of the problem of producing a photographic image of an object at a distance. A detailed account of these and other interesting experiments on light-cells was read before the Physical Society and published in the *Philosophical Magazine*, for March 1891.

He found that when two pieces of clean silver foil attached to glass plates were coated with an emulsion of chloride of silver in collodion and immersed in distilled water containing a few grains of common salt, the plates being connected with the terminals of a Thomson's galvanometer and one of them screened from the light, that on exposing the unscreened plate there was an electric current produced and the exposed plate was *negative* to the unexposed. The same effect was observed with plates coated with emulsions of silver bromide in water containing a little potassium bromide. When the plates were coated with iodide of silver in collodion by the wet silver-bath method, the liquid being water containing a little potassium iodide, there was a reversal of the nature of the exposed plate, it being *positive* to the unexposed. With coloured glasses in front of the exposed plates it was found that the red rays produced comparatively feeble currents, while those produced in the blue and violet rays were very great, but the directions of the current were the same for all rays. This agrees with Becquerel's observations. With plates coated with an emulsion of silver sulphide in potassic sulphate, the exposed plate was *positive*, the direction of the currents being the same for all rays, the strength of the current being least for the rays passing through the green glass.

With plates coated with an emulsion of silver nitrate in gelatine in a weak solution of barium nitrate the exposed plate was *positive*. The effect of the red rays was very small, and of the blue rays very great.

One of the most important points in Professor Minchin's observations is his discovery of the formation of an invisible developable deposit on silver plates coated with an emulsion of silver bromide, by the action of the electrical current from a single bichromate cell passing through the plates when immersed in water containing a little potassium bromide. He found (1) that the plate connected with the carbon pole, the cathode, was without the employment of any developer visibly blackened in its immersed part, (2) that no visible change took place on the other plate attached to the zinc, but when the plate was developed with an ordinary pyrogallic acid developer its immersed portion was also blackened. These effects were entirely due to the passage of the current and were strictly confined to those portions of the sensitive plate through which the current passed.

The special bearing of these observations upon the formation and composition of the invisible or visible developable photographic image formed by the action of light, does not appear to have been generally recognised. I began last year a series of observations on this subject which quite confirmed Professor Minchin's: unfortunately they were interrupted before completion, but I hope to resume them in due course, after the completion of the present series, and bring them before the Society on a future occasion.

Professor Minchin also found that by coating silver plates with eosine and gelatine, comparatively strong currents were obtained and the plates were very sensitive to variations in the light. The current generated by daylight in one of these eosine cells was sufficiently strong to produce the photographic action on a silver bromide plate without any preliminary exposure of the bromide plate to gaslight. He also describes a curious case of inversion of the current occurring in the eosine and other cells, which I have also noticed, the initial current being such as to make the exposed plate *positive* to the other. This current, however, was of very short duration and was succeeded by a steady and much stronger normal current in the opposite direction, the exposed plate being *negative* to the unexposed. On suddenly shutting off the light from the plate the instantaneous effect was to *increase* the existing current, the effect being merely impulsive, after which the current generally disappeared. This cell having been kept in the dark for a fortnight, it was found that while the inverse currents were produced as before, the initial current on exposure was enormously increased in magnitude and duration. It then disappeared gradually and was succeeded by a current in the reverse direction. When one of these plates was removed from the cell and immersed in water in presence of a clean silver plate, it was at once on exposure to light *negative*, like a silver plate coated in the ordinary way with an emulsion of eosine. In preparing these eosine-gelatine films, it was found to be an advantage to immerse them for a few minutes in a strong solution of alum in order to prevent the dye from washing out of the film too readily.

With silver plates coated with napthalene red and gelatine the effects were not so strong as with eosine; the exposed plate was *positive* and with strong red rays there appeared to be a reversal of the sign of the E. M. F.

Plates coated with iodine green and exposed to sunshine gave currents with an E. M. F. amounting to about $\frac{1}{20}$ volt.

M. F. Griveaux, experimenting on silver plates coated with a film of silver iodide, plunged into solutions of iodine of different strengths, circulating through the cell, found that the maximum value of the E. M. F. developed by light acting on one of the plates decreased as the strength of the iodine solution increased, till a certain point was reached at and above which the E. M. F. was *nil*. Also that this point was regulated by the distance of the plates from the source of light; the nearer the plates the higher the concentration point of the solution and *vice versâ*. The same effects were observed with silver chloride and bromide. (*Comptes Rendus Acad. Franc.*, CVII, 1888, p. 837.)

I have entered somewhat fully into these previous experiments because very little appears to be generally known about the subject and it seemed desirable to bring together the scattered observations.

In carrying out my experiments I have used two kinds of cells, one horizontal and one vertical, more usually the latter. It consists of a glass cell in which the plates can be coupled face to face or back to back, one being screened from light by the other and by one or two interposed screens of ruby or yellow glass, the cell being covered all round except at an opening on one side. This glass cell is enclosed in a wooden box with a shutter on one side sliding in front of an opening about 1·5″ × ·5″, corresponding to the one in the glass cell. In front of this shutter there are grooves in which coloured glasses can be placed in front of the opening. The upper part of the wooden case is open, but can be closed by a lid, through which, if necessary, a funnel may be passed to admit of solutions being poured into the cell without letting in light. The silver plates used with this cell are 4 inches long, and 1¼ inches wide, other plates, such as photographic sensitive dry plates or celluloid films, being about the same size or smaller.

The other cell is a modification of the form used by Becquerel in his earlier experiments, and consists of a wooden trough divided into two compartments by a double wooden screen which allows the free circulation of the electrolytic fluid, while completely shutting off light from the unexposed compartment. This trough is covered with a lid, having two large openings fitted with hinged shutters, to the underside of which mirrors are attached for the purpose of reflecting light at will on to one or other of the sensitive surfaces in the compartments below. By this arrangement the whole of the sensitive plate can be exposed to light, instead of only part of it, as in the vertical cell, and at the same time the perfect protection of the unexposed plate from strong light is better secured than it is in the vertical cell. This horizontal trough is constructed to take two plates 3¼″ × 4¼″ or smaller.

In most cases, even under favourable conditions, the light-currents observed, are exceedingly weak, and therefore a very sensitive form of galvanometer is necessary. The one I have used is the latest modification of the Rosenthal micro-galvanometer made by Edelmann, in Munich. It is said to be the most sensitive form of galvanometer made, enabling currents of about a billionth of an ampère to be read with a resistance in the coils of only 1,000 ohms. It is fitted with a telescope by which direct readings are made off the mirror from a millimetre scale placed at one metre from it. In this position and without the directing magnet, using the $\frac{1}{1000}$ shunt, with a total external resistance of about 60,000 ohms in circuit, the deflection caused by one gravity-Daniell cell is one millimetre division of the scale. By using the directing magnet the normal sensitiveness of the instrument can be very greatly increased, though in most of the experiments it has been found sufficiently sensitive without the magnet, and when used, the increase of sensitiveness has been limited to about five times the normal. The instrument can be set up in any position, is simple in construction and I find it very sensitive, convenient in use and easy to observe with fair precision, considering the difficulty there is in obtaining freedom from shake and tremor in a city like Calcutta built on a bad foundation of mud. In reading the scale which is 50 centimetres long, sub-divided into millimetres, I have usually fixed the zero point at 30, so that the readings above or below it may as far as possible show different signs of E. M. F., and the direction of the currents has been so arranged that a change in the position of the index to the apparent left from 30 to 0 shall indicate that the exposed plate is *negative* to the unexposed, as copper to zinc, while a change to the apparent right, 30 to 50, shows that it is *positive*, or as zinc to copper.

The coloured glasses used have been of the kinds ordinarily met with in the bazar. A deep ruby, a brownish yellow, a medium green, and a dark blue, and conditions being favourable it has generally been possible to observe some trace of a current even with the deep ruby in strong sunshine.

When observations were made with the spectroscope, whether with a Rowland's diffraction grating or prisms, it was found that the amount of light admitted through the slit for ordinary work, was quite inadequate, even when the slit was open at its widest; and it was therefore necessary, in most cases, to use a much wider slit, or to dispense with its use altogether; also to use the directing magnet on the galvanometer to increase the sensitiveness.

In all cases sunshine has been reflected on to the sensitive plates by means of a heliostat, as it was not convenient to use the direct rays of the sun. With the flat cell there were thus two reflections, but any loss of light was amply made up by the increased surface exposed.

As is usual in such experiments, there were almost invariably more or less strong local or polarisation currents generated between the plates themselves, especially when they were freshly immersed in the solutions, and it was generally found desirable to leave the cell from 12 to 24 hours before use, so as to give time for these currents to subside. Sometimes, however, from half an hour to an hour, or even in some cases a few minutes is sufficient. It was found, too, that even if there was no polarisation current at the commencement of an experiment, the action of light occasionally gave rise to fairly strong currents quite independent of, and sometimes opposed to, the currents produced by exposure to sunshine, while at others they were in the same direction. Thus it was sometimes difficult to ascertain how far the currents observed were due to light or to polarisation. The only test was the retrograde movement of the needle after shutting off the light.

Another difficulty in making these observations may be noted, and that is, the apparent reversals of current which are due in many cases to decrease in the strength of the light, though the decrease may be almost imperceptible. For the same reason, if coloured glasses be applied without first completely shutting off the light after the plates have been exposed to sunshine, there is an apparent reversal due to the loss of power in the light, and not to change of direction of the E. M. F. As a rule my observations with coloured glasses or the spectrum have agreed with Becquerel's and Minchin's that no reversal of sign is produced by any of the coloured rays. At the same time, I have found that in some cases the blue rays appear to have a reversing tendency, as might be anticipated from their very strong reversing action on certain forms of sensitive photographic plates containing iodide or bromo-iodide of silver. This point, however, requires much more complete investigation with the aid of the spectroscope, and will be further considered when dealing with the silver haloids. During the time I have been engaged with these observations, the weather has been unusually changeable and cloudy for the time of year, and hence it has been difficult to compare the results of observations on different days. For this reason it has been impossible to give more than general indications of the amount of deflection caused by the action of light in the cases recorded: exact observations would have to be made with a standard light.

It seemed desirable to commence the observations with experiments on plain silver plates in different fluids. The plates used were not quite pure, having been reduced from various silver residues, and were about ·974 touch. They were four inches long and one and a quarter inch wide, and were usually cleaned with fine emery powder, or with emery cloth immediately before and after use. It is, however, better to make sure of the purity and cleanliness of the surface of the plates for each operation by heating them red-hot and then immersing them in dilute sulphuric acid. As facilities for doing this with thick plates were not readily available, it has been omitted in all the following observations. As a rule, the plates were immersed in the solutions to a depth of from 2 to 2½ inches, care being taken to avoid moistening the upper unimmersed parts by capillary action or otherwise, and so exposing them to irregular currents from this cause. The plates were about half an inch apart, being kept separated by two wooden blocks with a dark ruby glass plate between them.

I. SILVER PLATES IN WATER.

Distilled Water.

Distilled water being almost a nonconductor, the currents observed were naturally exceedingly weak and could only be clearly seen with strong sunshine. The deflection observed without the magnet varied from ·5 to 3 divisions of the scale, and in nearly all cases the exposed plate was positive to the unexposed, and formed the anode or dissolving plate of the couple. In some cases the exposed plate became more sensitive after the first exposure, but after a few exposures lost all sensitiveness. The current being so small, it was not thought necessary to experiment with coloured glass or the spectrum. With the directing magnet placed as before described the deflection was increased to about 6·5 divisions.

Tap Water.

The tap water used was the filtered Hooghly water, supplied in the town mains. It is fairly pure and free from lime salts, but chlorides are present in moderately large proportion, the amount of chlorine varying from ·5 to 1·4 parts per 100,000, and at the time of the experiments it would be about 1 to 1·2 parts per 100,000. The total hardness varies from 3·15 to 11·5 parts and would be about 9 parts per 100,000 at the time of the experiments. In most of the cases observed the exposed plate was distinctly positive to the unexposed, as with distilled water; but in some cases it was negative, and in one or two instances the action was irregular. The plates were rather more sensitive than they were in distilled water, the normal deflections without the directing magnet varying from 1 to 7 divisions of the scale, but usually they were between 2 and 4.

In one case in which the plates had been in the cell for about 38 hours, and there was only a very slight cell-current, exposure to sunshine gave a deflection of + 4·5 divisions without the magnet, but with it the deflection in bright sunshine rose to + 20 divisions, and even in diffused light was + 5 divisions. Exposing under ruby glass gave a deflection of + ·5; yellow glass + ·7; green glass +1; blue glass + ·5 in diffused light, and + 7·5 in sunshine. Trials were also made with the grating spectroscope without the directing magnet, but the results were not conclusive and the unsettled weather has, so far, prevented their being repeated with the galvanometer in its most sensitive state. The plates were found very sensitive to changes in the strength of the light, but after repeated exposure to sunshine they seeemed to lose sensitiveness. By the action of the water a greyish deposit of chloride was formed and in some cases a darkened image of the exposed part of the plate could be seen. It may be noted that my experience does not agree generally with that of Hankel, who found that, of two silver plates immersed in water the plate exposed to white clouds, or to the setting sun, was negative. I find, however, that on one occasion when fresh plates were exposed to daylight, the exposed plate was negative, the deflection being about − 1·5 divisions of the scale. On again exposing the same plates to sunshine the exposed plate was positive, and remained so afterwards on further exposure. On two other occasions of exposure to daylight, the exposed plate was also negative. When exposed to sunshine the plates were almost invariably positive. I have noticed this difference with plates in other solutions.

II. SILVER PLATES IN DILUTE ACIDS.

As we have seen above, Becquerel found that with plates of gold or platinum, immersed in acid solutions, the plate exposed to the light was always positive. The same rule seems to apply to silver plates in most cases, but not in all.

Dilute Sulphuric Acid.

The action of dilute sulphuric acid upon silver plates under the influence of light seems to be rather irregular, but I find on looking through all the experiments made, that in nearly all cases the first exposed plate of each pair had a negative tendency when first exposed, though it might become positive by subsequent exposures and in the same way the second plate of the pair, which was screened during the first exposure, might also be positive on first exposure. The general tendency was undoubtedly positive. The irregularities may be partly due to the plates not being quite pure.

With silver plates immersed in distilled water acidified with about a drop of acid in some 60 cc. of water, the exposed plate was generally positive when exposed to bright sunlight, the deflection without the directing magnet varying from 1 to 4·5 divisions of the scale, sometimes increasing after repeated exposures. In one experiment, however, the exposed plate was distinctly and uniformly negative, even after the position of the plates had been reversed, but subsequent exposure of the reversed plate made it positive. In another it was negative on first exposure and then positive.

With a pair of plates in tap water, acidified in the same way, the plate exposed to sunshine was first negative with a deflection of −3 divisions on the scale, which increased to −6 divisions by subsequent exposures. Exposure under coloured glasses also gave a negative deflection, amounting with red glass to −1, with yellow and green glasses to −2; with blue glass to −5, and exposed to sunshine again −6, as before. The same plates being again exposed to sunshine later on were also negative at first, but became positive and much more sensitive. Under coloured glasses the deflections were also positive and very much larger than on the first exposure of the plate. After reversal, so that the former unexposed plate became the exposed plate, the deflection was again negative, amounting to −7 divisions, and increasing with the exposure. These plates were very sensitive to changes in light, and there was a perceptible deposit of chloride (?) on their immersed surfaces.

With plates immersed in a 1 per cent. solution of sulphuric acid in distilled water, it was found that if the plates were exposed to sunshine a very short time after being immersed in the dilute acid, they were at first negative and fairly sensitive to light but afterwards became positive; whereas in a case when the plates were left standing for 24 hours to reduce the polarisation, they were positive, and much less sensitive than the plates which were negative. After a short time they seemed to lose all sensitiveness.

In tap water containing the same proportion of acid, the exposed plates were generally positive on opening the shutter; but the current quickly decreased, and with some plates after several exposures they gave a negative deflection.

With plates immersed in distilled water containing two per cent. of acid the deflections were usually positive and the plates seemed to become less sensitive by repeated exposure and by keeping.

With plates immersed in dilute acid at 5 per cent., which had been allowed to stand for 24 hours, and showed a very small cell-current, the first plate of the pair was distinctly negative when exposed, the deflection being -4, decreasing with exposure to -2, but the second plate when exposed after reversal of the plates in the cell was positive with a deflection of $+6$. Two other pairs of plates in freshly-mixed acid were positive on first and subsequent exposures. The addition of acid lowered the sensitiveness of the plates considerably.

All the plates showed a slight grey deposit or stain on the immersed ends. but no trace of an image.

Dilute Nitric Acid.

With nitric acid the exposed plates are nearly always positive and the action is far more uniform than with sulphuric acid, especially when an appreciable quantity of acid, as one per cent. and over, is used. Becquerel also found the exposed silver plate positive in dilute nitric acid.

With distilled water acidified with about 1 drop of acid in 70 cc., the exposed plate was positive on first exposure, but afterwards became negative. The plates were not very sensitive, the deflections without the directing magnet varying from 1 to 3 divisions of the scale.

With 1 per cent. of nitric acid, *sp. g.* 1·250, in distilled water, after 14 hours standing, the exposed plate was uniformly positive, and more sensitive than with the acidulated water, the deflections in sunshine being from 3·5 to 5·5 divisions, without the directing magnet. There was a slight greyish deposit on the plates, but no image on the exposed part.

With three per cent. of the same acid in distilled water, after 22 hours standing, the first plate exposed in weak sunshine first showed a negative deflection of 2 divisions, and after that was positive, the deflection of repeated exposures being steadily about + 5 divisions, without the magnet. With the directing magnet, the deflection was about + 20 divisions with the 100 ohm, or $\frac{1}{10}$, shunt.

After the experiment the solution was found to contain silver.

Dilute Phosphoric Acid.

With dilute phosphoric acid the deflections were almost always positive. Plates freshly immersed in a mixture containing 1 per cent. of the acid, sp.g.1·750, in distilled water and exposed to sunshine, gave an initial deflection, without the magnet, of + 23 divisions, but this quickly decreased with further exposure. After shutting off the light the cell-current was found to have increased, and on again opening to sunshine the deflection seemed slightly negative, but the action generally was irregular. Subsequent exposures with the same cells or after the plates had been reversed showed positive deflection and the plates were less sensitive than at first.

With the same acid at 5 per cent. the deflections were uniformly positive. With plates exposed to sunshine after 16 hours, the deflection without the magnet was + 8 divisions, but, as in the former case, it was less on subsequent exposure. The same decrease of sensitiveness after exposure was noticed with the plates after reversal in the cell.

Dilute Hydrochloric Acid.

With 1 per cent. of hydrochloric acid, *sp. g.* 1·150, in distilled water, the exposed plates have shewn themselves uniformly positive, and owing to the formation of a deposit of chloride they are much more sensitive to light, than are plates immersed in acids which do not form a sensitive compound with the silver. The deflections with sunshine, without the directing magnet, were from + 6 or + 7, when the plates were first exposed, to + 36, when they had been kept for some hours longer and then exposed. The plates were covered with a greyish deposit of chloride on the immersed parts, and there was a distinct darkened image on the part of the plate exposed to light. Coloured glasses all gave positive deflections, the red being the smallest, and then the green.

With 3 per cent. acid, after 22 hours resting, the plates exposed to sunshine were positive. The increase of acid seemed to reduce the sensitiveness very much, the highest deflection in sunshine, without the directing magnet, being + 16, while after the plates had stood for 37 hours it was only + 11.

There was a dark grey deposit of chloride on the immersed parts of the plates, which took a violet or purple colour on exposure to light, and gave off an odour of chlorine.

Dilute Hydrobromic Acid.

With dilute hydrobromic acid containing 10 cc. of the ordinary pharmaceutical dilute acid, of 10 per cent., to 100 cc. distilled water, the plate exposed to sunshine or diffused daylight was uniformly *negative* and extremely sensitive to light, the first deflection in bright sunshine being about − 187 divisions, without the directing magnet, decreasing to a steady reading of about 140 divisions. Even coloured glasses gave fairly large deflections; red, − 13; yellow, − 54; green, − 64; blue, − 103.

With dilute acid of double the above strength, the exposed plate was also uniformly negative, but the plates did not seem so sensitive, the deflection in sunshine, without the magnet, being only − 82; but the readings depend very much on the strength of the light, and this was variable at the time of observing.

In both these cases the plates were coated with a grey-greenish-yellow deposit of bromide, which turned dark on exposure, and formed a visible image of the exposed part of the plate.

Dilute Hydriodic Acid.

As pure hydriodic acid is somewhat troublesome to prepare, I roughly made up a solution of it by precipitating one gramme of barium iodide, dissolved in water, with sulphuric acid and adding water to make up 100 c.c. There was, however, a considerable quantity of free iodine present, the solution being of a light sherry colour.

The cell containing two clean silver plates immersed in this solution was left standing for 15 hours. The plate exposed to sunshine was then found strongly negative, the deflection, without the directing magnet, being − 110 divisions of the scale, afterwards going up to − 130 divisions. The plate was, very insensitive to weak daylight, the reading being only 12 divisions when the sun was hidden behind clouds. With coloured glasses fairly large deflections were obtained, always in the same negative direction; red glass giving − 15 with daylight, and − 16 with sunlight; yellow − 16·5 with daylight, and − 20 with sun; green − 14 with daylight, and − 19 with sun; blue − 16 with daylight, and − 80 with sun. By keeping, the plates became less sensitive. They were covered with a strong loose deposit of iodide, under which the silver surface was darkened. A faint image of the exposed part was visible.

Dilute Glacial Acetic Acid.

With plates freshly immersed in dilute glacial acetic acid of 1 per cent., the plate exposed to sunshine was positive, the deflection being about + 6·5 divisions, without the magnet; a second exposure gave a deflection of + 8·3 divisions. By keeping for 24 hours the plates were less sensitive, but remained positive.

Plates immersed in dilute acid of 5 per cent. and kept 24 hours before exposure were less sensitive than the above, the deflection with sunshine being only + 3 divisions without the magnet, and they became less sensitive by further exposure, but were always positive.

Dilute Formic Acid.

The only other organic acid I have yet tried is formic acid, one per cent. in distilled water. After the cell had been standing 24 hours, exposure to sunshine gave a deflection amounting to about 8 divisions, the exposed plate being positive. The same plates after another 24 hours standing were found to have become very insensitive, the deflection being only one or two divisions of the scale, the exposed plate still being positive.

III. SILVER PLATES IN ALKALINE SOLUTIONS.

Becquerel found that when platinum or gold plates were immersed in alkaline solutions, the plate exposed to light was negative. So far as my experience goes, this rule does not hold good with silver, the sign of the exposed plate being almost always positive. I have not tried these solutions very thoroughly, but the results obtained with potash and other salts used seem conclusive.

Solution of Potassium Hydroxide.

With a solution of one per cent. of caustic potash in distilled water, the cell having been standing 22 hours, the cell current was *nil*.

Exposure to bright sunshine gave a deflection of about 9·5 divisions without the magnet, the exposed plate being positive. With the magnet the deflection was about + 45 divisions in sunshine, and + 9 divisions in daylight. With sunshine under blue glass the deflection, with the magnet, was + 31; under green + 9; yellow + 8; red + 4·5. There was no deposit on the plates and no image of the exposed parts.

Solution of Potassium Carbonate.

With a solution of one per cent. of anhydrous potassium carbonate, the cell having been standing for about 14 or 15 hours, the cell-current was very small, and the plate exposed to light, either daylight or sunshine, was found to be positive, the deflection in the former case being + 22, and in the latter + 63·5, without the magnet.

With tap water made alkaline with a few drops of ten per cent. solution of the carbonate in about 60 c. c. of water, the exposed plates were also positive and very sensitive on first exposure, but the current decreased with further action of light, and in subsequent exposures the plates were less sensitive to light. They also lost sensitiveness by being kept in the cell.

Solutions of Sodium Carbonate.

With silver plates exposed shortly after immersion in 1 per cent. solution of anhydrous sodium carbonate in distilled water, the plate exposed to sunshine was positive, the deflection being about + 5 divisions without the magnet. In subsequent exposures the plates were less sensitive, but remained positive.

With a stronger solution, at 5 per cent., the results were similar, but the plates seemed somewhat more sensitive.

Solution of Lithium Carbonate.

With plates exposed shortly after immersion in a 1 per cent. solution of lithium carbonate in distilled water, the plate exposed to sunshine was positive, the deflection being about + 6 divisions without the magnet. The plates lost sensitiveness after the first exposure as well as by keeping for 34 hours, but remained positive.

Dilute Solution of Ammonia.

With a solution of 4 c. c. of strong liquid ammonia in 100 c. c. distilled water, the cell having been left standing some 14 or 15 hours, the plates were found to be exceedingly insensitive to light; even with the magnet the deflections in sunshine were only about 2 divisions, the exposed plates being positive.

Another pair of plates immersed in a freshly-mixed solution, containing 2 c. c. of liquid ammonia in 100 c. c. of water, and exposed soon after immersion, were also found insensitive, but not so much so as the last; the deflection on first exposure in sunshine being about 3 divisions, without the magnet. The current, however, decreased on further exposure, and the same effect was observed in subsequent exposures. After a short time no current was perceptible.

The immersed parts of the plates showed no deposit.

Potassium Cyanide.

With a solution of potassium cyanide in distilled water, about 1 per cent., there was a strong negative polarisation current in the cell when first prepared, which took several hours to subside. When freshly immersed the exposed plate was negative, but not very sensitive, the deflection without the magnet being only − 4 divisions for sunlight. By keeping the cell 24 hours the polarisation current subsided entirely, and the plate exposed to sunshine was again negative with a deflection of − 3·5 divisions. A slight movement of the cell, however, seemed to cause a reversal of the current with a deflection of + 6·5 divisions which further continued for another 6·5 divisions after the light had been shut off. The same effect was observed on subsequent exposures, first the plate was negative then positive, while the polarisation current increased in the same direction. After a time the plate seemed to become quite insensitive to light.

With the same plates reversed there was again a very large initial negative polarisation current. On first exposure of a plate to sunshine the deflection was − 14·4 divisions, without the magnet. On shutting off the light, the negative polarisation current was found to have very largely increased. On second exposure the plate was first negative and then positive. On shutting off the light the current continued + 2·5 divisions in the same direction and then turned back in its original direction. The plates were coated with a dark grey deposit, thicker at the upper part of the plates than at the lower. About the immersion line there was a yellowish-white deposit, and the plates were deeply corroded, but no sign of an image of the exposed part was visible.

From the above experiments it would appear that as a general rule sunlight has an oxidising or dissolving effect on silver, whether in acid or alkaline solutions, the exposed plates being nearly always positive and consequently forming the anode of the voltaic couple. With solutions decomposed by silver and forming sensitive compounds the action is variable.

IV. PLAIN SILVER PLATES DRY.

When a comparatively large silver plate about 5 × 4 inches, not immersed in any solution, but with its ends connected by silver bands to the terminals of the galvanometer, the directing magnet being specially placed so as to increase the normal sensitiveness about 13 times, was exposed to light so that the upper half remained unexposed, it was found possible to detect a slight current between the exposed and unexposed halves of the plate; the exposed half being positive to the unexposed. With an uncleaned plate that had lain in a drawer for some months, the deflection in sunshine was fairly large, amounting to about 10 divisions, or rather more than the deflection caused by the contact of dry zinc and copper. When, however, the same plate had been carefully cleaned with a solution of cyanide of potassium followed by the usual rubbing with emery cloth, the deflection was found to be still positive, but much smaller, being only about 1·5 divisions on first exposure, and by repeated exposure it was reduced to about ·25 division.

With subsequent exposures the deflection was generally in the same direction, but once, after fresh cleaning, it was negative. With a plate of pure silver deposited on glass, freshly polished, the first exposure gave after a short interval, a fairly strong negative deflection, but with subsequent exposures at intervals the deflections have been sometimes negative and sometimes positive, but always very small, so that the observations are somewhat uncertain. Plates of almost perfectly pure silver, 999·5 touch, obtained through the kindness of the Mint Master, Lt. Col. Baird, R. E., F. R. S., gave also rather indefinite results, owing to the smallness of the currents, and though the deflections were generally positive on first exposure of the plates, they were sometimes negative, or became so by prolonged exposure. The general tendency, however, appeared for the plates to be positive under the influence of light, and, if this is the case it would seem to point to some slight oxidising action on the surface. At the same time, the results obtained with *pure* silver and the fact that in so many cases the deflections have been first positive and then negative, appear to favour the conclusion that such plates are really negative. It was clearly ascertained that the currents produced were not due to the action of heat, because with the plate first observed and with the purest silver plates, the action of heat applied at the exposed end of the plate was to give a positive deflection, but with the less pure silver plates used in the cells and others largely alloyed with copper, the heated end of the plate was always negative to the cool end. The deflection invariably increased with the continuance of the heating, and was always in the same direction on repetition of it.

The light currents, on the other hand, showed a decrease of deflection from repeated exposures and sometimes a change of sign in a direction contrary to the heat currents shown by the same plates. The observation is rather a difficult one and requires further repetition under more favourable conditions of light, in order to obtain definite results.

I have also tried the effect of solutions of alkaline haloid salts upon silver plates, but as this paper is already beyond the usual limits, it may be well to defer the account of these and other experiments on photographic plates containing the haloid salts of silver to a future paper.

Noviciæ Indicæ VI. *A review of the genus* Colquhounia.—*By* D. PRAIN.

[Read May 3rd.]

Writing in 1885 (*Flora of British India*, iv, 674) Sir Joseph Hooker had to say of this genus :—"I am quite unable to distinguish the first three species,[*] or to reconcile their specimens, descriptions and published drawings with one another." And in 1890, when engaged in arranging the Calcutta Herbarium material of the natural order LABIATÆ to which the genus belongs,[†] the writer, after considerable study came to the same conclusion. Since then, however, the opening up of the hill-country to the east of the Irrawaday has enabled the Calcutta Herbarium to send native collectors into hitherto unknown portions of the Shan Hills. One result has been the communication of suites of specimens that have helped to clear up some of the doubtful points. Briefly stated, the result of a renewed study has been that there seems to be no necessity for recognising more than two species in the genus ; both these species are, however, very variable, and include between them seven more or less distinguishable and definable forms. The present paper consists of a short bibliographical review of these with diagnoses of all of them, and with an account of their distribution appended.

The genus COLQUHOUNIA was founded by Wallich in 1822,[‡] on specimens collected by himself in Nepal, in honour of his friend Sir Robert Colquhoun, Bart., of the H. C.'s service. His diagnosis, and voluminous description of *Colquhounia coccinea*, the species then proposed, he republished, practically unaltered, two years later,[§] giving at the same time a coloured plate which represents however, not the typical plant originally described, but a variety with smaller flowers. In a note at the end of this second description, Wallich distinguishes by name and by a general diagnosis a second species, *C. vestita*. This, he says, comes from various localities in Nepal, at a higher elevation than the stations for *C. coccinea*, and occurs also in Kamaon. He says that *C. vestita* flowers in the height of the rains, *C. coccinea* at the end of the rains and in the cold weather ; the main distinction given, however, is one of tomentum ; this is described as being in *C. coccinea* scaly-stellate, rusty, dense and friable, in *C. vestita* soft, white, thick and separable.[||] The flower-spikes and flowers are admitted to be similar ; plainly therefore the distinction is not a far-reaching one.

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[*] *Colquhounia coccinea* Wall., *C. vestita* Wall., *C. elegans* Wall.

[†] *Journ. As. Soc. Bengal*, lix, 2, 294.

[‡] *Trans. Linn. Soc.*, xiii, 608.

[§] *Tent. Flor. Nap.*, i, 12 t. 6.

[||] *Tent. Flor Nap.*, i, 14.

The LABIATÆ of the H. E. I. Company's Herbarium were distributed by Wallich in 1829;[*] Bentham, who revised for Wallich the naming of this particular order, treated these two species somewhat differently. In *C. coccinea* he recognized three distinct forms:—[†]

(1). *C. coccinea* proper; the pink-flowered plant originally described in *Trans. Linn. Soc.*, and re-described in *Tent. Flor. Nap.*

(2). VAR. *β. major* Benth.; the Nepalese plant from higher levels and with denser tomentum, treated by Wallich as identical with the plant from Kamaon that he distinguished specifically from *C. coccinea*.

(3). VAR. *γ. parviflora* Benth.; an orange-flowered plant, not clearly differentiated by Wallich in either of his descriptions, but figured by him in the *Tentamen* as typical *C. coccinea*.

On the other hand the name *C. vestita* was strictly limited to the plant from Kamaon already referred to, which had been communicated to Wallich by Blinkworth,[‡] and a new species from Burma, *C. elegans*, was for the first time mentioned.[§] In the same year Bentham in another place defined the genus, mentioning all three species, but not there distinguishing the varieties of *C. coccinea*.[||]

In 1832 Wallich again dealt with these *Colquhounias*, figuring both *C. vestita* and *C. elegans*.[¶] He diagnosed *C. vestita* from *C. coccinea* by its "ovate-oblong much attenuate acuminate leaves, very densely hoary tomentose below, as are the branches," adding that this character comprises all the points in which *C. vestita* differs from *C. coccinea*. From the original specimens it is evident that this figure of *C. vestita* was taken from one of Blinkworth's Kamaon specimens; Wallich did not however adopt Bentham's limitation of *C. vestita* to that locality, for he replaced in the species the Nepalese plant that forms Bentham's *C. coccinea* VAR. *major*. In immediate sequence come the definition and figure of *C. elegans*, the Burmese species; of this he mentions having only seen one shrub; the best distinction, Wallich says, between this and *C. coccinea*, which it much resembles, is the colour of the flowers—orange, dotted with crimson specks, instead of red. The plant is described as having leaves very softly tomentose on both surfaces, an idea by no means conveyed by the figure, which represents a plant that, as Sir Joseph Hooker says,* cannot be distinguished from *C. coccinea* VAR. *parviflora*. These two plants are however remarkably dissimilar in tomentum, the hairs being stellate in VAR. *parviflora*, as they are in all the other forms of *C. coccinea*, but simple in *C. elegans*. As regards the *degree* of tomentum of *C. elegans* it is the description that is accurate, the figure that is misleading.

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[*] *Lith. Cat.* n. 2084—6.

[†] *Wall. Lith. Cat.* n. 2085/1, 2085/*β*, 2085/*γ*.

[‡] *Wall. Lith. Cat.* n. 2086.

[§] *Wall. Lith. Cat.* n. 2084.

[||] *Bentham, Synops. Labiat.* in *Bot. Reg.*, xv, sub 1292.

[¶] *Plant. As. Rar.*, iii, 43, tt. 267, 268.

In 1834 Bentham again dealt with the genus†, and on this occasion still confined *C. vestita* to the Kamaon plant of Blinkworth, though in *C. coccinea* he now recognized only two forms:—

(1). *C. coccinea* proper, which now includes the original plant described by Wallich, as well as the Nepalese portion of Wallich's *C. vestita;* this variety therefore now includes the original *C. coccinea* and Bentham's own *C. coccinea* VAR. *major.*

(2). VAR. *β. parviflora* Benth., which is the same as the plant so named in 1829.

The Burmese *C. elegans* is defined in the Wallichian sense.

In 1848 Bentham‡ followed in the main his treatment of 1834, but as regards *C. coccinea* confined the Wallichian number 2085 to VAR. *parviflora* alone, although, as we have just seen, this number applies *in the Catalogue* to every specimen of *Colquhounia* collected in Nepal. Under *C. vestita* also Bentham diverged somewhat from his previous treatment by admitting into the species a plant sent by Griffith from Assam. This is, however, a plant that must be kept specifically apart from *C. vestita* if *C. vestita* deserves to be held specifically distinct from *C. coccinea ;* while, even if *C. vestita* and *C. coccinea* be conspecific, this Assam plant is still varietally distinct from both.

In 1850 Sir William Hooker figured§ as *C. coccinea* a plant raised at Kew from seed sent by Wallich from Nepal. This is the plant originally figured by Wallich in the *Tentamen*, and therefore is not exactly the one originally described by him there and in the Linnean Society's *Transactions;* it is not typical *C. coccinea*, but is Bentham's *C. coccinea* VAR. *parviflora.*

In 1851 Schlechtendal described‖ as *C. mollis* a plant whose origin he was unable precisely to trace. His description is, however, so full and clear as to leave no room for doubt that his plant is identical with the Assam one referred by Bentham to *C. vestita.**

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* *Flora of British India*, iv, 674.

† *Labiat. Gen. & Sp* 644.

‡ *DC. Prodr.*, ii, 457.

§ *Bot. Mag.*, lxxvi, t. 4514.

‖ *Linnaea*, viii, 681.

In 1873 Houllet figured as *C. tomentosa*† what appears to be the same plant.

In 1876 Bentham and Hooker speak of the possible existence of a fourth species‡; it is not clear whether by this fourth species be meant Schlechtendal's *C. mollis*, which is cited indirectly through a reference in Walpers; or a Burmese plant collected by Mason, Parish, Anderson and Kurz since published as *C. tenuiflora* Hook. f.§ but which in 1877 Kurz‖ described as *C. elegans*. Kurz wrote under the disadvantage of only knowing Wallich's plant from the figure which Wallich gives of it; that figure, as has already been said, is quite misleading.

The next account to be noticed is the most important of all—that by Sir Joseph Hooker in the *Flora of British India*. Here four species are described :—

1. *C. coccinea* Wall.; with Bentham's VAR. *parviflora* excluded.
2. *C. vestita* Wall.; limited, in the sense adopted by Bentham in 1848, to the Kamaon plant of Wallich and the Griffithian plant from Assam,¶—the Nepal plant originally included in *C. vestita* being excluded and Schlechtendal's *C. mollis* not being referred to; the identity of *C. vestita* as a whole with typical *C. coccinea* is suggested.
3. *C. elegans* Wall.; limited to the original Wallichian plant from the Taong Doung Mts; its identity with *C. coccinea* VAR. *parviflora* Benth., is suggested.

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* There are two minor references to the genus by Walpers, *Annales* iii, 363 (1852) where he mentions *C. coccinea*; and *Annales* v, 689 (1858) where he gives Schlechtendal's diagnosis of *C. mollis*: this last reference is cited in the *Genera Plantarum* though the original description in *Linnaea* is not.

† *Houllet, Rev. Hortic.* (1873) p. 131. It should, however, be pointed out that Sir Joseph Hooker does not agree with the writer's view in this respect. He refers Houllet's plant to *C. coccinea* (and it may be that form of *C. coccinea* called by Bentham VAR. *major*); Griffith's plant is referred in the *F. B. I.*—as Bentham referred it—to *C. vestita*; *C. mollis* is not quoted in Sir Joseph's article.

‡ *Genera Plantarum*, ii, 1208.

§ *Flor. Brit. Ind.*, iv., 674. This form—apparently more common than true *C. elegans*—extends from Tenasserim to Yunnan. In the Calcutta Herbarium it is in evidence that at one time Kurz thought this distinct from the *C. elegans* of Wallich's description—of which he had no specimen—and proposed naming it *C. martabanica*. Later, he decided that it must be the *C. elegans*, of Wallich's figure, which it resembles, as to tomentum, rather more closely than the true plant does.

‖ *For. Flor. Brit. Burma*, ii, 278.

¶ In Mr. C. B. Clarke's Herbarium this Assam plant is distinguished from the Kumaon *C. vestita* proper, as *C. vestita* VAR. *rugosa* C. B. Clarke MSS.

4. *C. tenuiflora* Hook. f.; the new species referred to above.

Two more recent references to the genus have now to be noticed.

Mr. Hemsley in his *Index Sinensis*[*] mentions one species; this he identifies, though rather doubtfully, with *C. coccinea*. The plant comes from Hupeh, South China, and the same form has more recently been collected in the Kya Valley, Upper Burma, by Genl. Gatacre. It is not *C. coccinea*, but is much more nearly allied to *C. elegans*; though a very distinct form, it is probably quite sufficiently differentiated if treated as a variety of the last named species.

Sir Henry Collett and Mr. Hemsley in a paper *On a Collection of plants from Upper Burma and the Shan States*[†] mention two species:—

1. *C. elegans* Wall.; the true Wallichian plant, never met with since it was collected by Wallich till it was obtained in 1887 by Genl. Collett, who speaks of it as certainly the most beautiful *Labiate* of the Shan Hills. Like *C. coccinea* VAR. *mollis* (*C. mollis* Schlecht.) this is always an erect shrub;[‡] as regards colour of flowers there are two distinct forms, one with pale salmon-coloured, the other with dark red corollas.
2. *C. vestita* Benth., *not of* Wallich; not the true Wallichian plant, but Schlechtendal's *C. mollis*, Mr. Clarke's *C. vestita* VAR. *rugosa*.

The generic descriptions given by Wallich, Bentham, Schlechtendal and Hooker are so accurate and full that nothing can be added to them, and little is necessary beyond providing brief diagnoses of the various forms met with in the genus. Of these last there are altogether seven, and though in this paper they are treated as only of varietal rank, it may well be that other writers will find it necessary to consider them distinct species; indeed, as species at present go in the natural order LABIATÆ, it cannot be denied that forms so very distinct as the real *C. vestita* of Kamaon and as Hooker's *C. tenuiflora* are well entitled to the higher ranks. But what has to be pointed out very distinctly is that on those who may feel compelled to give this higher rank to these species of Wallich and of Hooker, it will be incumbent to recognise also

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[*] *Journ. Linn. Soc.*, xxvi, 299 (1890.)

[†] *Journ. Linn. Soc.*, xxviii, 1–150 (1890),

[‡] Genl. Collett remarks (*Journ. Linn. Soc.* xxviii, 8) on the discrepancy between this fact and the definition by Kurz (*For. Flor. Brit. Burma*, ii, 278) of *C. elegans* as 'a scandent or half-scandent shrub.' Kurz's definition however does not in the least refer to Wallich's original plant but to that other form collected by himself in Pegu, named by Sir Joseph Hooker *C. tenuiflora*, which is always a scandent plant.

Schlechtendal's *C. mollis*, and to give specific rank to that very distinct new form collected in Northern Burma by Gatacre and in South China by Henry.

It is remarkable that the character from tomentum which has been mainly relied upon—and with rather unsatisfactory results—in diagnosing the various species, should still prove the most effective and reliable. It has, however, to be noted that hitherto only the degree of tomentum and not its nature has been referred to, the difference between the simple hairs of the *C. elegans* series and the stellate hairs of the *C. coccinea* series of forms having been overlooked.*

COLQUHOUNIA Wall.

Nat. Ord. *LABIATAE.*

Tribe. *STACHYDEAE.*

Tall, robust, rambling herbs with rounded branches. *Leaves* ovate, margins dentate or crenate, petioled, acute or acuminate, base cuneate, rarely truncate or cordate, tomentose, as are the branches, with stellate or simple hairs. *Whorls* axillary, or in dense or lax-flowered spikes or racemes, of pink, orange, or scarlet, concolorous or spotted flowers. *Calyx* distinctly 10-nerved, equally 5-toothed, throat naked. *Corolla* tube incurved not annulate, throat inflated; galea entire or more rarely notched, shorter than the almost equally 3-lobed lower-lip. *Stamens* 4, ascending under the upper lip, the lower pair longer; anthers conniving in pairs, the cells divaricate, confluent. *Disc* equal; *style* shortly 2-fid with subequal lobes. *Nutlets* oblong, compressed, with the tip produced as a submembranous wing.

1. Colquhounia coccinea Wall., *ampl.*

Tomentum of stellate hairs on stems and leaves; hairs on the corolla many-celled, glandular at the tip; wings of nutlets sub-laciniate, not longer than body of nut; calyx teeth triangular.

Himalaya: Indo-China.

var. *a. typica;* leaves dentate-crenate, tomentum white, usually sparse, ultimately almost disappearing; flowers large, pink or red. *C. coccinea* Wall., Trans. Linn. Soc., xiii, 608 (1822); Tent. Flor. Nap., i., 13, *fig. excl.* (1824); Cat. n. 2085/1 (1829); Benth., Bot. Reg., xv., *sub* 1292 (1829); Lab. Gen. & Sp. 644 (1834): DC. Prodr., xii, 457 (1848); Walp., Ann., iii, 268 (1852): Hook. f., Flor.

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* The co-ordinate difference in the nature of the glandular hairs on the corolla, which is as striking, was pointed out to the writer by his friend Mr. Brühl, who kindly went over the forms after they had been sorted out.

Brit. Ind., iv, 674 (1885). *C. coccinea* VAR. *β. major* Benth. *in* Wall. Cat. n. 2085/*β* (1829). *C. vestita* Wall., Tent. Flor. Nap., i, 14, (1829), *and* Pl. As. Rar., iii, 43 (1832), *in part and excluding the Kamaon locality and the figure.*

NEPAL; on Gossain Than, *Wallich! Scully!* and Sheopore, *Wallich!* SIKKIM: Jongri, *King's collector!* and Lachen, *Hooker! G. Gammie!* KHASIA: Mairung, *Hooker and Thomson! Mann!*

A shrub 8–10 feet high, erect when standing alone but of sprawling habit and semi-scandent when growing with other species. In the form originally issued as VAR. *β. major* Benth., the tomentum is white as in *C. vestita*, and unusually dense, while the flowers are generally of a rather paler pink than in the specimens originally intended as typical, where the leaves are often ultimately quite glabrous from an initial rusty pubescence, and the flowers are dark red. Both forms have, however, similarly shaped dentate-crenate leaves, and in both the wings of the nutlets are nearly as long as the body of the nut These are the forms to which, in spite of his figure, it would be necessary to restrict Wallich's name *C. coccinea*, if *C. vestita* and the others are distinct species.

VAR. *β. vestita* Prain; leaves (sometimes cordate at the base) crenate, crenations large, tomentum dense, floccose, white, separating in patches but not disappearing completely; flowers large pink. *C vestita* Wall., Tent. Flor. Nap., i, 14 (1824) *in part, the Kamaon plant only*; Pl. As. Rar., iii, 43, t. 267 (1832) *as to fig.*; Wall., Cat. n. 2086 (1829): Benth., Bot. Reg., xv, *sub* 1292 (1829); Lab. Gen. & Sp. 644 (1834); DC. Prodr., xii, 457 (1848) *excl. the Assam plant*: Hook. f., Flor., Brit. Ind., iv, 674 (1885) *the Kamaon plant only.*

KAMAON; Srinagar, *Blinkworth!* Naini Tal, *Anderson!* Mussoorie, *King!* Kali valley, *Duthie* n. 3308! CHUMBI; at Tak-Chang, *King's collector!*

Like the preceding this is according to circumstances erect or semi-scandent. The flowers are pale red as in *C. coccinea β. major*, where also the tomentum is white. The leaves, however, (which in *C. vestita* are crenate, none of the crenations being sharp pointed) enable us to distinguish easily the two forms. The gathering from Chumbi has the thinner tomentum of *C. coccinea β. major*, but the leaf-margins are crenate not serrate; it thus serves to connect *C. coccinea* with *C. vestita.*

VAR. *γ. parviflora* Benth.; leaves and flowers smaller than in the type, tomentum rusty, flowers orange or golden yellow, with orange red lobes. *C. coccinea* Wall., Tent. Flor. Nap., i, t. 6 (1824) *the fig. only*; Hook., Bot. Mag. t. 4514 (1850). *C. coccinea* VAR. *parviflora* Benth. *in* Wall., Cat. n. 2085/*γ*

(1829); Lab. Gen. & Sp. 644 (1834); DC. Prodr., xii, 457 (1848).

NEPAL; on Sheopore, *Wallich!*

Scandent; this variety is represented only by specimens collected by Wallich; the leaves have larger teeth and somewhat resemble those of *C. elegans*, which is however always a shrub. It is quite as entitled to specific rank as is *C. vestita;* if treated as a species it ought to be known as *C. parviflora.*

VAR. δ. *mollis* Prain; leaves crenate, crenations very small, tomentum dense, rusty, permanent; flowers large, orange or red. *C. mollis* Schlecht., Linnaea, viii, 681 (1851); Walp., Ann., v, 689 (1858). *C. tomentosa* Houllet, Rev. Hortic., (1873), 131. *C. vestita* Benth., DC. Prodr., xii, 457 (1848) *not of Wall., the Assam plant only*: Hook. f., Flor. Brit. Ind., iv, 674 (1885) *excluding the Kamaon plant; not of* Wall.: Collett & Hemsley, Journ. Linn. Soc. xxviii, 116 (1890); *not of* Wall., *C. vestita* VAR. *rugosa* C. B. Clarke Mss.

SIKKIM; Balasun, *King's collector!* BOOTAN; *Griffith!* MISHMI; *Griffith* n. 4028 (*Kew Dist.*)! KHASIA; Mairung, *Simons! Oldham! Clarke* n. 16138! Shillong, *Mann! Collett!* Dingling, *Clarke* n. 5900! Cherra, *Hooker and Thomson! Clarke* n. 5322! MANIPUR; Kassome, *Watt* n. 5123! BURMA; Shan hills at Pwehla, *Collett!*

An extremely distinct form, always a shrub, and easily recognised by its stout virgate habit and by its nutlets with very short wings. This might be still considered specifically distinct even if C. *vestita* were merged in *C. coccinea*, and if looked upon as a good species it ought to bear the name *C. mollis* Schlecht. The leaves differ from those of *C. coccinea* in being always crenate, and from those of *C. vestita* in the small size of the crenations, and in the rusty, not white, tomentum.

2. COLQUHOUNIA ELEGANS Wall., *emend.*

Tomentum of simple hairs on stems and serrate leaves; hairs on the corolla few-celled, glandular at the base; wings of nutlets entire, acute, longer than body of nut; calyx teeth acuminate.

INDO-CHINA; S. CHINA.

VAR. α. *typica*; whole plant densely, softly tomentose; flowers in very dense many-flowered axillary heads; corolla dark-red or salmon-coloured, with or without crimson spots, tube long, throat wide. *C. elegans* Wall., Cat. n. 2084 (1829); Benth., Bot. Reg., xv, *sub* 1292 (1829); Wall., Pl. As. Rar., iii, 43, t. 268 (1832): Benth., Lab. Gen. & Sp. 645 (1835); DC. Prodr., xii, 457 (1848): Hook. f. Flor. Brit. Ind., iv, 674 (1885); Collett & Hemsley, Journ. Linn. Soc. xxviii, 116 (1890).

Manipur; Sirohifurar, *Watt* n. 7443! Burma; Taong Doung Mts., *Wallich:* Shan Hills at Toungye, *Collett!* at Mone, *Manders! Fulton!* at Lwekaw, *Manders!* Ruby Mines district, frequent, *King's collectors!*

A shrub, 8 to 10 feet high, and apparently never scandent; the flowers are sometimes red (*Collett, King's Collectors*) sometimes salmon-coloured with crimson spots (*Wallich*) sometimes uniformly salmon-coloured (*Collett, Fulton, Manders*).

var. β. *pauciflora* Prain; almost glabrous throughout, flowers in loose few-flowered axillary heads; corolla red, tube very short, throat wide. *C. coccinea* Hemsl., Journ. Linn. Soc., xxvi, 299 (1890) *not of* Wall.

S. China; Ichang, *A. Henry* n. 3334! Burma; Kya Valley, *Gatacre!*

A very distinct, always scandent form, with a much more slender habit than the preceding; the nutlets are however not distinguishable, and the tomentum is of precisely the same character, though so much slighter in degree. If this is treated as a distinct species, which will be necessary if specific rank continues to be claimed for *C. tenuiflora*, it might be known as *C. pauciflora*.

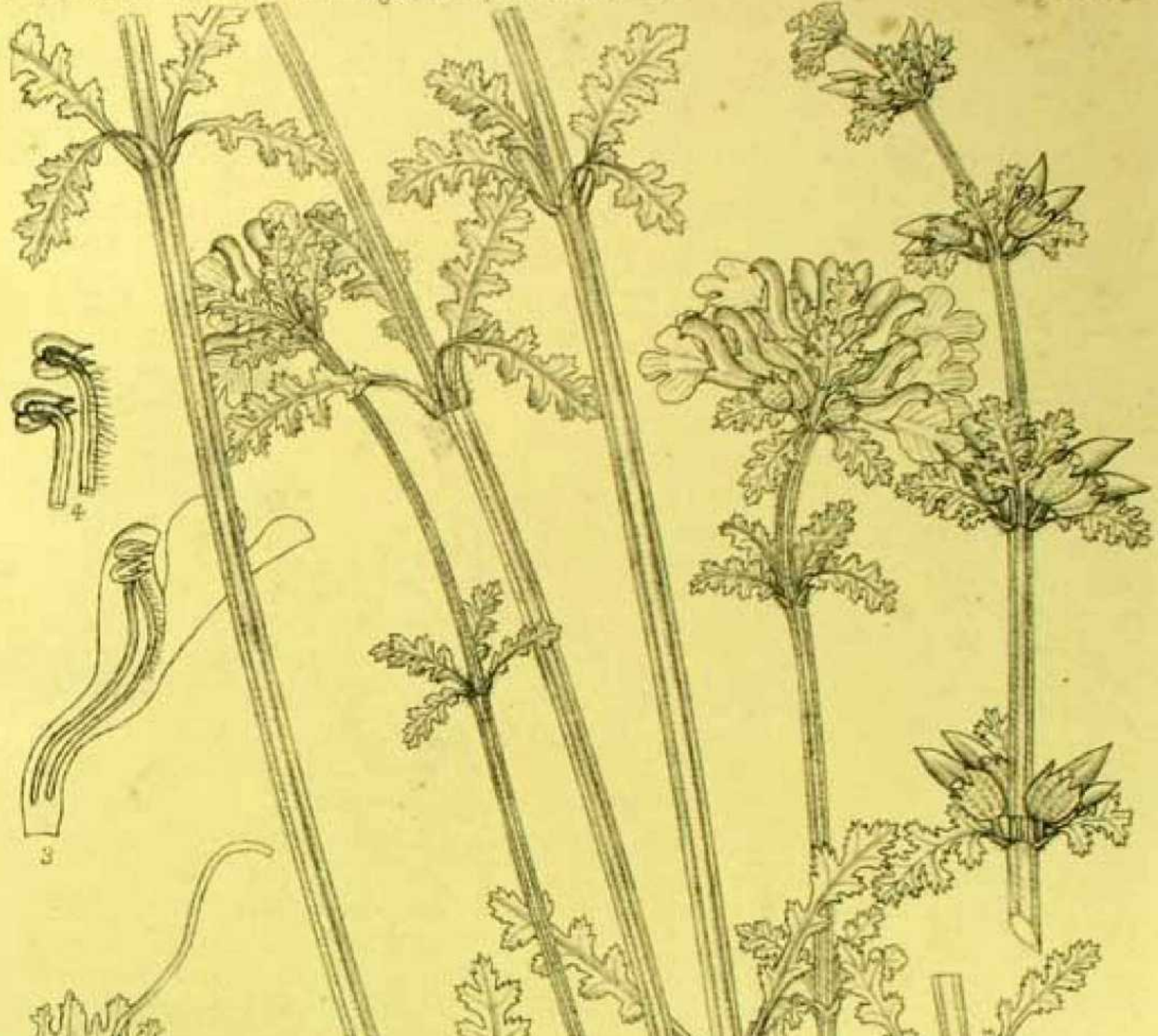
var. γ. *tenuiflora* Prain; sparsely hairy throughout, flowers in loose many-flowered long axillary racemes; corolla red, tube very long, throat narrowed. *C. tenuiflora* Hook. f., Flor. Brit. Ind., iv, 674 (1885). *C. elegans* Kurz, For. Flor. Brit. Burma, ii, 278 (1877) *not of* Wallich. *C. martabanica* Kurz Mss. in Herb. Calcutta.

S. China; Yunnan, *Anderson!* Burma; Poneshee *Anderson!* Pegu, *Kurz!* Karenni, *Mason!* Tenasserim; Moulmein, *Parish!*

Also a very distinct form; in habit exactly like the last, but with much longer flowers than even in the type, and with an absolutely, as well as relatively, narrower corolla-throat. Distinct, however, though the form is it is not convenient to give it specific rank, as this would necessitate the recognition of *C. parviflora, C. mollis*, and *C. pauciflora* as distinct species also.

PRAIN, Jour. Asiat. Soc. Bengal, 1893, Vol. LXII, Pt. II

PLATE I.



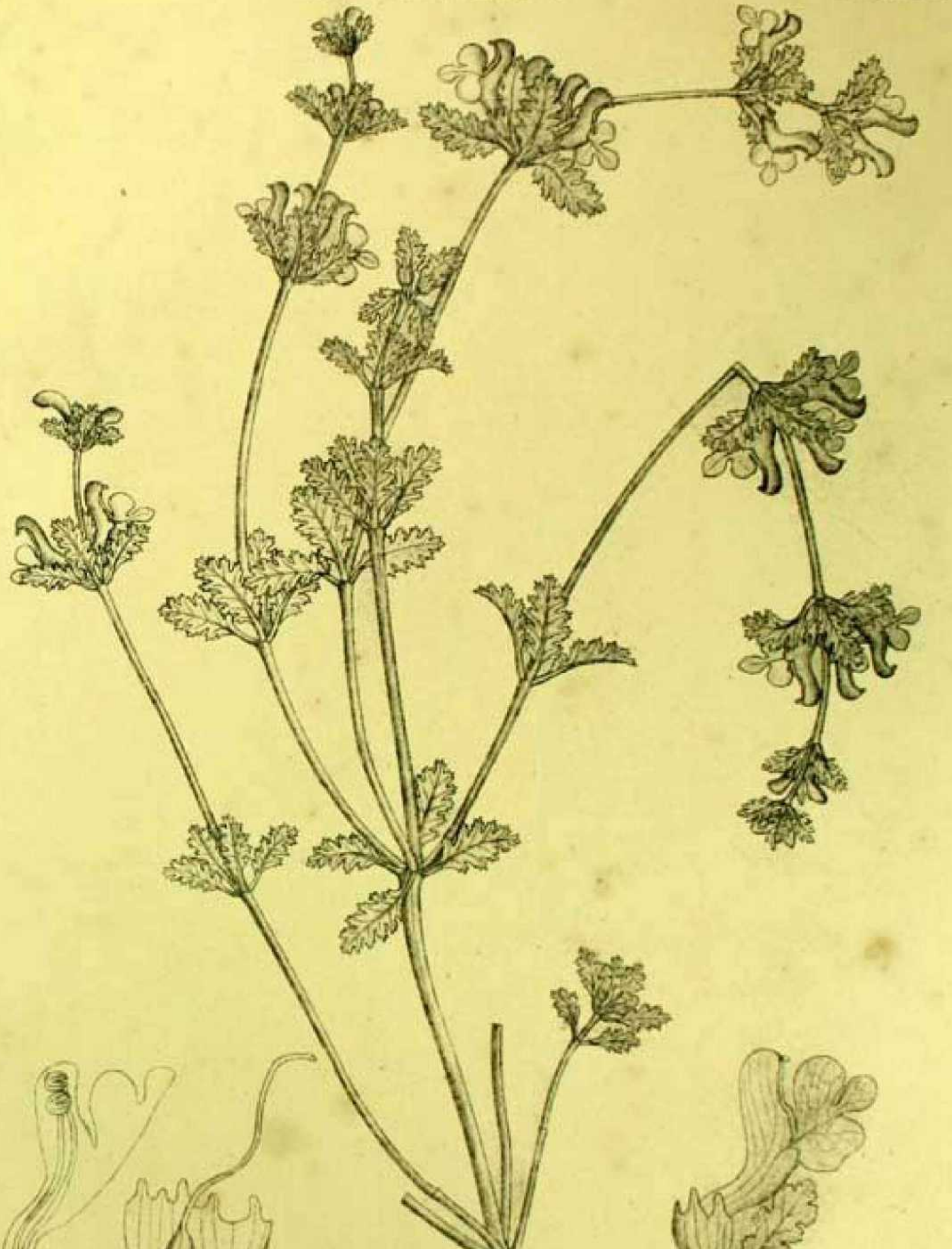
D. Prain delt.

A. C. Mukerjei lith.

PEDICULARIS DIFFUSA Prain.

PRAIN, Jour. Asiat. Soc. Bengal, 1893, Vol. LXII, Pt II

PLATE II.



A. D. Molla delt.

A. C. Mukerjei lith.

PEDICULARIS FLACCIDA Prain.

pair are hirsute; the anthers though muticous as in *P. verticillata* are contiguous and not discrete. The fruit is unknown.

As both these species belong to one natural group it may be useful to provide a key, modified, so as to admit of their reception, from the key already published by the writer (*Ann. Roy. Bot. Garden, Calcutta*, iii, 94), in which the relative position of these and of the previously known species is shown.

VERTICILLATAE.

- Galea less than half the length of the lip :—
  - Bracts flabellate, spike long, dense; calyx small, subglobose, not cleft, teeth small, entire; anterior filaments hairy ... *P. spicata*.
  - Bracts oblong or linear, spike short; calyx large ovate, teeth large :—
    - Calyx not cleft, teeth crested except the upper; filaments not hairy ... *P. lineata*.
    - Calyx cleft, teeth all entire; anterior filaments hairy ... ... *P. likiangensis*.
- Galea about equal in length to the lip :—
  - Calyx-tube not net-veined between the ribs :—
    - Calyx cleft, hardly toothed; anthers discrete, anterior filaments hairy ... *P. verticillata*.
    - Calyx not cleft, distinctly toothed; anthers contiguous, filaments not hairy ... *P. flaccida*.
  - Calyx-tube net-veined between the ribs :—
    - Calyx hardly cleft, teeth crested except the upper; anterior filaments hairy... *P. diffusa*.
    - Calyx distinctly cleft, teeth entire :—
      - Margin of galea even; anterior filaments hairy ... ... *P. refracta*.
      - Margin of galea toothed; filaments not hairy ... ... *P. szetschuanica*.

Explanation of the Plates.

PLATE I. Pedicularis diffusa *Prain*.

1, Flower with bract; 2, calyx with ovary and style; 3, half of corolla showing staminal insertion; 4, stamens; 5, capsule; 6 seed: 1, 2, 3 *and* 5 *magnified* $\frac{3}{1}$; 4 *and* 6 *magnified* $\frac{4}{1}$.

PLATE II. Pedicularis flaccida *Prain*.

1, Flower with bract; 2, calyx with ovary and style; 3, half of corolla showing staminal insertion: *all magnified* $\frac{3}{1}$.

Some Observations of the Electrical action of Light upon Silver and its Haloid Compounds :—By Colonel J. WATERHOUSE, I. S. C., *Assistant Surveyor General of India.*

[Received April 20th : Read May 3rd.]

In my paper on "Electro-chemical Reversals with Thio-carbamides," read at the meeting of the Society in April 1891, it was shown that the peculiar reversals of the photographic image produced by the addition of very minute quantities of a thio-carbamide, or sulpho-urea, to an eikonogen developer appeared to be connected with and accompanied by electro-chemical action, if not actually brought about by it. It was remarked also that the experiments brought forward pointed to the conclusion that, at any rate as regards the haloid salts of silver, the formation and development of the photographic image is to a very great extent influenced by electrical action, more so perhaps, than has generally been recognised, although the fact of photographic action being accompanied by electrical phenomena has been known since the earliest days of photography. It was suggested that a further investigation into the theory of photography based on electro-chemical laws, might be of value in throwing light upon much that is now obscure and uncertain as regards the formation and development of the invisible photographic image formed by the exposure to light of silver haloid compounds.

Since that time I have given a good deal of attention to the subject and tried several experiments in various ways with the object of ascertaining the electrical action of light, in connection with photography, on plates of pure silver immersed in various fluids as well as on dry plates and other forms of silver haloid compounds in ordinary photographic use. Also on the action of electrical currents in forming developable compounds of silver haloids similar to those formed by light, and, further, on the electrolysis of ordinary photographic developers and on the currents produced during the development of the photographic image. These observations are not yet sufficiently complete to found any sound deductions upon, but I hope to complete them later. In the meantime, I have thought that a short note on some observations I have lately made on the electrical action of light upon plain silver plates in various solutions, might be of interest and form a suitable introduction to any further notes on this subject I may be able to bring before you. It does not pretend to be complete or exhaustive, and can only be considered as a contribution towards a systematic investigation of the question.

light was admitted. It was also inversely proportional to the square of the distance of the source of light from the apparatus. An oil lamp was used. The instrument appeared to show an exact proportionality between the intensity of the light and that of the current, and its great sensitiveness and precision would enable it to be used as a very delicate photometer. In these experiments he found that the electromotive force exerted by the November sun upon iodised silver plates through an opening 30 mm. wide was $\frac{1}{15}$ of a Daniell cell; with a petroleum lamp, at 8 inches distance, it was only 0·004 Daniell.

Dr. J. Moser afterwards, in 1887, in working on Egoroff's plan found that the photo-electric current might be greatly increased by treating the chlorised, iodised or bromised silver plates with solutions of erythrosin, benzo-purpurin and other dyes, and in sunlight he observed currents of a strength equal to half a volt (Eder's *Jahrbuch der Photographie, &c.*, 1888, p. 297.)

At the meeting of the British Association, in 1880, Professor G. M. Minchin gave an account of his experiments on the generation of electric currents by the action of light on silver plates which were coated with emulsions of bromide, chloride, iodide and other salts of silver in gelatine and collodion, as well as with eosine, fluorescine and various aniline dyes, the object of these experiments being the solution of the problem of producing a photographic image of an object at a distance. A detailed account of these and other interesting experiments on light-cells was read before the Physical Society, and published in the *Philosophical Magazine*, for March 1891.

He found that when two pieces of clean silver foil attached to glass plates were coated with an emulsion of chloride of silver in collodion and immersed in distilled water containing a few grains of common salt, the plates being connected with the terminals of a Thomson's galvanometer and one of them screened from the light, that on exposing the unscreened plate there was an electric current produced, and the exposed plate was *negative* to the unexposed. The same effect was observed with plates coated with emulsions of silver bromide in water containing a little potassium bromide. When the plates were coated with iodide of silver in collodiōn by the wet silver-bath method, the liquid being water containing a little potassium iodide, there was a reversal of the nature of the exposed plate, it being *positive* to the unexposed. With coloured glasses in front of the exposed plates it was found that the red rays produced comparatively feeble currents, while those produced in the blue and violet rays were very great, but the directions of the current were the same for all rays. This agrees with Becquerel's observations. With plates coated with an emulsion of silver sulphide in potassic sulphate, the exposed plate was *positive*, the direction of the currents being the same for all rays, the strength of the current being least for the rays passing through the green glass.

With plates coated with an emulsion of silver nitrate in gelatine in a weak solution of barium nitrate, the exposed plate was *positive*. The effect of the red rays was very small, and of the blue rays very great.

One of the most important points in Professor Minchin's observations is his discovery of the formation of an invisible developable deposit on silver plates coated with an emulsion of silver bromide, by the action of the electrical current from a single bichromate cell passing through the plates when immersed in water containing a little potassium bromide. He found (1) that the plate connected with the carbon pole, the cathode, was without the employment of any developer visibly blackened in its immersed part, (2) that no visible change took place on the other plate attached to the zinc, but when the plate was developed with an ordinary pyrogallic acid developer its immersed portion was also blackened. These effects were entirely due to the passage of the current and were strictly confined to those portions of the sensitive plate through which the current passed.

The special bearing of these observations upon the formation and composition of the invisible or visible developable photographic image formed by the action of light, does not appear to have been generally recognised. I began last year a series of observations on this subject which quite confirmed Professor Minchin's : unfortunately they were interrupted before completion, but I hope to resume them in due course, after the completion of the present series, and bring them before the Society on a future occasion.

Professor Minchin also found that by coating silver plates with eosine and gelatine, comparatively strong currents were obtained and the plates were very sensitive to variations in the light. The current generated by daylight in one of these eosine cells was sufficiently strong to produce the photographic action on a silver bromide plate without any preliminary exposure of the bromide plate to gaslight. He also describes a curious case of inversion of the current occurring in the eosine and other cells, which I have also noticed, the initial current being such as to make the exposed plate *positive* to the other. This current, however, was of very short duration and was succeeded by a steady and much stronger normal current in the opposite direction, the exposed plate being *negative* to the unexposed. On suddenly shutting off the light from the plate the instantaneous effect was to

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Vol. LXII, Part II.—NATURAL SCIENCE.

No. II.—1893.

On the Flora of Narcondam *and* Barren Island.—*By* D. Prain.

Plates III and IV.

[Read May 3rd].

§ Introductory Sketch.

The Indian Ocean is broken on the north by the Indian Peninsula into two roughly triangular seas. The eastern, rather the smaller, forms an area known vaguely as the Bay, Gulf, or Sea of Bengal—the first of these names being that most usually employed—bounded on the west by Ceylon and India, on the east by the Malay Isthmus (Tenasserim) and Indo-China, and on the north by the Gangetic Delta. The ocean-surface thus defined is, however, further differentiated into three distinct hydrographical areas.

These areas are (*a*) the Bay of Bengal, a bight limited to the west by the Kistna Delta, to the east by Cape Negrais and situated to the north of an arbitrary line—the parallel of Lat. 16° N.—beyond which it passes into (*b*) the Sea of Bengal, stretching from Coromandel and Ceylon, on the west, to the Andamans and Nicobars on the east. The Sea of Bengal opens southwards into the Indian Ocean proper, from which it is hydrographically rather definitely limited by the somewhat rapid upward shelving of its floor from the bottom of that ocean to a uniform depth of 2200 fathoms along a line roughly coincident with the parallel of Lat. 6° N. Thereafter its floor is a plain and practically a level one, for it slopes so gradually northwards that, as it passes into the Bay proper, its depth is still 1400 fathoms. No such clear delimitation exists between Sea and Bay; the plain that forms their common floor still slopes gradually upwards towards the north till, in the neighbourhood of Lat. 20° N., the edge of the shelf of the Gangetic Delta is reached.

The southern edge of the floor of the Sea of Bengal may, in spite of its depth of over 2000 fathoms, be taken as, in a sense, the margin also of the continent of Asia, for there is more than the rapid increase of slope towards the bottom of the Indian Ocean to characterise it. To the west it coincides with that remarkably abrupt terrestrial elevation which results in the island of Ceylon, off the south-west coast of which island, less than 40 miles from the Basses, the ocean depth of 2300 fathoms is reached. To the east a precisely similar terrestrial elevation, though of smaller size and much less height, is met with. Just as Ceylon lies, a pear-shaped eminence, to the east of Lon. 80° E., so to the east of Lon. 90° E. lies the pear-shaped eminence known as Carpenter's Ridge,* a terrestrial mass that rises from a depth of 2300 fathoms in Lat. 5° N., till in Lat. 6° N. and Lon. 90° 30′ E., it reaches a point which carries only 1380 fathoms. The 'thick end' of the pear in both cases faces the south, and just as the 'stalk,' in the case of Ceylon, tails north-westward into the Indian Peninsula, the 'stalk,' in the case of Carpenter's Ridge, tails north-eastward into Middle Andaman. There are these differences between the two; the connecting ridge between Ceylon and India carries nowhere more than 8 fathoms, that between Carpenter's Ridge and the Andamans carries 1600 fathoms, while the highest point of Carpenter's Ridge is as much beneath as the highest point in Ceylon is above sea-level.

The third area (*c*) is the land-locked sea †, bounded on the west by the Andamans and Nicobars, on the north by the Irrawady Delta, on the east by Tenasserim and Kedah, and prolonged south-eastward into the Straits of Malacca, between Sumatra and the Malay Peninsula. This sea is not, as a rule, distinguished by any general name, though that portion of it close to the Irrawaday Delta is spoken of as the Gulf or Bay of Martaban; it has, however, sometimes been spoken of as the Gulf of Pegu, and more recently has received the much more appropriate name of the ANDAMAN SEA.*

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* Alcock: Annals and Magazine of Natural History, ser. vi., iv., 377.

† Carpenter: Records of the Geological Survey of India, xx, 48, had proved, as conclusively as it is possible in the absence of actual soundings to prove, that this body of water must be separated from the Sea of Bengal by a ridge nowhere deeper than 760 fathoms, the shallowest sounding known between Acheen and the Nicobars, since the temperature at 1200 fathoms east of the ridge is that appropriate to 740 fathoms to the west of it. Since then the indication of 736 fathoms as the depth on the line from the Nicobars to the Andamans is a striking confirmation of the justice of Carpenter's reasoning.

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* Alcock: Annals and Magazine of Natural History, ser. vi., iv., 378. The degree of confusion in nomenclature that prevails is sufficiently exemplified in the various Atlases of recent date. Keith-Johnstone's "Royal Atlas"—an excellent example of an English Atlas—shows, on the same sheet (India, southern sheet) in the general map, the Bay of Bengal and the Sea of Bengal limited as they are in the text, though the Bay is called the "Gulf" of Bengal: in the small map of the South-Eastern provinces placed on the same sheet this "Gulf" is called, as is more usual, the Bay. No name is given to the Andaman Sea, though the Gulf of Martaban is distinguished. In Stieler's Hand-Atlas—an excellent example of a German Atlas—we find (Sheet 67, by Berghaus) the phrase "Meerbusen von Pegu" used as the precise equivalent of Alcock's later-published but perferable name of "Andaman Sea;" the Gulf of Martaban of the English maps is designated, much more correctly than in English maps, "Bai von Martaban." So much confusion of names and their incidence, renders it necessary to insist on some definite system of nomenclature, with a rigid-definition of the areas to which the names apply.

It would seem therefore that German geographers are prepared to admit the distinctness of the Andaman Sea as a geographical area, while to modern English geographers the necessity for considering the question has apparently not occurred. If, however, at present they refuse to recognise this as a truly land-locked area deserving of a specific designation, the following passage from a letter dated Calcutta, the 4th March 1795, from Major A. Kyd to Sir John Shore, then Governor-General, will show that even a hundred years ago those who knew the area best realised its true nature. Kyd says:—The Andaman Islands, "comprehending what "are called the Great and Little Andamans, extending from N. Lat. 18°31′ "southward, and lying nearly in a N. and S. direction between 92° and 93° E. of "Greenwich, are part of a continued range of islands extending from Cape Negrais "to Acheen Head, including the Preparis, Cocos, Car Nicobar, and the Great and "Little Nicobars, the whole being a chain of islands between which there is reason "to believe that there is a continuation of soundings, entirely dividing the eastern "part of the Bay of Bengal." Kyd was Superintendent of the second, or Port Cornwallis settlement in the Andamans, instituted in 1792, when the settlement, under Blair at Old Harbour, now Port Blair, begun in 1789, was abandoned.

As an example of the usage which terms the whole sea-area between India and Indo-China the "Bay of Bengal," may be mentioned a paper by Hume (*Stray Feathers*, vol. ii.) wherein these two islands, along with Preparis, the Cocos, and of course the Andamans and the Nicobars, are termed the Islands in the Bay of Bengal, as opposed to Ceylon, on the one hand, and the Mergui Archipelago, on the other. This is also the usage of the Admiralty Maps of the region, and though it is certainly indefensible on hydrographical grounds, since the area to the east of the Andaman-Nicobar chain fulfils in every particular—far more so than the Sea of Bengal itself—the conditions laid down in the definition of a "Sea," it is preferable to the slip-shod system that distinguishes the Bay of Bengal from the Sea of Bengal, without distinguishing between the Sea of Bengal and the Andaman Sea.

It is in this last-named area that the islands of Narcondam and Barren Island, which form the subject of the present paper, are situated. These islands the writer was, through the kindness of Col. Cadell, v. c., late Chief Commissioner of the Andamans, enabled to visit in March and April 1891, in order to investigate their Flora. Narcondam was examined for ten days in the end of March; after an interval occupied in visiting Little Andaman and the Nicobars,[*] Barren Island was examined from April 5th to April 8th.

The volcanic island of Narcondam is situated in the Andaman Sea in Lat. 13° 26′ N. and Lon. 95° 15′ E., 80 miles to the east of Port Cornwallis in North Andaman, 74 miles north-north-east of Barren Island, 150 miles to the south of the nearest point on the coast of Pegu, and 250 miles due west of Mergui. The island rises abruptly out of deep water, more especially on its eastern, western and southern sides, to a height of 2330 feet above sea level, and of 8000 feet from the floor of the Andaman sea between it and North Andaman to the west, and between it and Tavoy on the east.[†]

The soundings on which the conclusion is based are given in the following table:—

TABLE I.[‡]—*Soundings in the vicinity of* Narcondam.

GENERAL DIRECTION OF LINE OF SOUNDINGS.	DISTANCE IN MILES FROM CENTRAL PEAK.	DEPTH OF SOUNDINGS IN FATHOMS.
E. S. E.	1½	90
E. S. E.	2	75
E. S. E.	2½	138
E. S. E.	3¼	284
E. S. E.	3¾	333
E. S. E.	4¼	486
E. S. E.	100	1050
S. S. E.	1½	242
S. S. W.	1¾	182
S. S. W.	2¾	465
S. S. W.	3½	652
S. S. W.	24½	1010

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[*] Proceedings of the Asiatic Society of Bengal for 1891 (December), p. 156.

[†] Stieler: Hand Atlas, sheet 67 shows depths, which are quite wrong, of 2097 and 2200 fathoms to the E. and S. E. of Narcondam; how these errors have arisen the writer cannot trace. Sheet 58 of the same Atlas gives the true depth.

[‡] This Table, with the corresponding one for Barren Island, is mainly derived from Mallet and Carpenter, Records of the Geological Survey of India, xx, 46, *et seq.*, with additional soundings from a copy of the Sounding-Book of H. M. I. M. Survey Steamer "*Investigator*," kindly lent by Dr. Alcock.

TABLE I.—*Soundings in the vicinity of* Narcondam.—(*Continued.*)

GENERAL DIRECTION OF LINE OF SOUNDINGS.	DISTANCE IN MILES FROM CENTRAL PEAK.	DEPTH OF SOUNDINGS IN FATHOMS.
S. W.	50	1140
W. N. W.	1½	162
W. N. W.	2½	407
W. N. W.	3	509
W. N. W.	3½	585
W. by S.	40	922
N. N. E.	2	74
N. N. E.	2½	104
N. N. E.	3¼	150
N. N. E.	4½	411
N. N. E.	9½	362
N. N. E.	16	290
N. N. E.	52	70
N. N. E.	70	50

The island is a fairly-regular oval with the longer diameter in a line running north-north-east to south-south-west; this diameter is two and a half miles long, the other one and a half. The regularity of outline is somewhat broken at the north-east corner by an oblong peninsula about three furlongs long and half a mile across; this spit, which is occupied by a steep-sided twin-peaked hill, quite dwarfed by the central mass, is in no sense detached from the rest of the island but passes through two or three intervening heights into the main peak. This peak, situated slightly to the south and west of the centre of the island, is crowned by three small points of which the most northern is the highest. The two others, situated a quarter of a mile to the south and to the south-east, respectively, are at the seaward ends of two ridges that diverge from the highest peak, and are separated by the beginning of a deep gorge. The northern point, as already mentioned, reaches 2330 feet; the point to the south is 2150 ft., that to the south-east 2200 feet high. The gorge that separates the two latter, after passing southward between them for about a quarter of a mile, turns south-west round the shoulder of the lower one, and thus partially separates the south end of the island, as a narrow ridge 1200 to 1500 feet high, from the rest of the hill. It is, however, only the western end of this ridge that is free, the eastern end is connected, by means of a narrow but lofty ridge, with the south-eastern part of the central peak. Numerous other gorges, none of them however so striking as that just described, furrow the hill on every side.

The chief interest of this configuration resides in the misapprehensions as to the structure of the island to which it has given rise. McCelland mistook either the ravines or the ridges between them for streams of lava[*]; Kurz has described and figured the island as a central volcanic cone, surrounded by an outer ring, not much over half the elevation of the central mass, and very largely broken down.[†] Seen from Kurz's point of view (N. W., $\frac{1}{2}$ N., at a distance of 20 miles) an oblique view of the mouth of the yawning south-western gorge is obtained, while the main mass hides the connection of its southern wall with the central peak. At the same time the peaks already mentioned as connecting the main hill with the somewhat outlying north-eastern spit, serve to conceal their own connections and complete the illusion. At this distance too the three hummocks at the top of the peak look very much like as many points on the edge of a crater. In a nearer view from the same direction the appearance of a central cone is still well-preserved, though the regularity of what seems at a distance the remains of an outer ring quite disappears.[‡] Even close in-shore it is impossible to say whether the three points on the peak are, or are not, indicative of the remains of a crater, the forest that clothes them disguising their true relationship. The appearance from another point of view (W. $\frac{1}{2}$ S., at a distance of 40 miles) agrees well with the description by Horsburgh of "a cone or pyramid with its summit broken off."[§]

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[*] McClelland: Jour. As. Soc., Beng., vii, 77. It would depend a good deal on the distance from which the island was seen, whether the ravines or the ridges between them be what were taken for 'lava-currents.' Seen from a distance of 6 miles or more, through a glass, the darker shadows caused by the gorges might well enough, as Ball (Records, Geol. Survey of India, vi, 89), and Mallet (Memoirs, Geol. Survey of India, xx, 281) suppose, be what led McClelland astray; as however the drawing on which McClelland based his opinion was taken from about a mile and a half, or two miles from the eastern shore—the drawing was made by Griffith—there is no doubt that what he took for streams of lava were the ridges between the ravines: on this side of the island these are, towards the top, bare and rugged, and are not unlike streams of lava. After all, however, McClelland had nothing to support his idea that the island was volcanic but its conical shape and its isolation.

[†] Kurz: Report on the Vegetation of the Andaman Islands, p. 4. Kurz appears to have had nothing more to go upon in supposing the island to be volcanic than had McClelland; the accident of configuration led him to go further than McCelland, and assume, not only that the island is volcanic, but that it is an island of the same type as Barren Island, in which there is an inner and an outer cone. And with the accounts and the appearance of Barren Island in his recollection—Kurz disposes cursorily of Barren Island in the sentence immediately preceding the one referred to —the idea is by no means unnatural.

[‡] Ball: Records of the Geol. Survey of India, vi, 89.

[§] Horsburgh: Indian Directory (ed. v), ii, 56.

Throughout the southern half of the island the coast line has been eaten by the sea into bare cliffs that vary in height from 50 to 800 feet. From the appearance these present to any one circumnavigating the island it would seem that these, even at the mouths of the gorges, and even if landing in spite of the heavy swell that usually surges round the island were feasible, must be altogether inaccessible. Much of the northern half of the island is similarly sea-worn, but the northern cliffs are not in many cases very high. The north-west corner of the island is a sharply triangular ness, with a high cliff for its northern, and a sloping hill-side, ending in lower cliffs, for its western seaface. This western slope overlooks a bight half a mile wide, but of only a furlong's recession. This bight, open to the north-west, is divided into two almost equal bays by a small detached islet, between which and the main island stretches a rocky reef. To the south of this islet and reef is a somewhat indifferent anchorage, and landing from a boat is possible on its small shingle beach, behind which a few coco-nut trees grow. This beach is close to the reef and at the mouth of a rather narrow gorge which leads fairly directly to the main peak.

The cliffs that form the east side of this ness overlook a much finer bight bounded on the east by the oblong spit already described, more than half a mile across, and with a recession almost equalling its width. The head of this bight further recedes into a small inviting-looking bay which, however, begins to shoal* about a hundred yards from the shore, and the strong swell that surges round either cape is broken as it crosses the bay into a heavy surf which renders landing neither pleasant nor safe.† This bay, which may be termed Coco Bay, is bounded by a level stretch of turtle-frequented sand, behind which is the only good example of *Pandanus* sea-fence on the island; behind the sea-fence is a fringe of coco-nut trees; beyond the coco-nut zone, and at the mouth of one of the largest gorges in the island, is a small stretch of level land, due, no doubt, like the shallowness of the bay, to the deposition of detritus from the main hill. In this flat patch, immediately behind the coco-nuts and to the west side of the stream-bed, is a grove of plantains.

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[*] Ball: Records of the Geol. Survey of India, vi, 89.

[†] Hume: Stray Feathers, ii, 109. The landing mentioned by Ball and described by Hume is the only one on record at this bay. Probably, however, it is not the only one that has been effected. Though the *Coco-nuts* that line its margin may have been introduced by the sea, this cannot be said of a grove of *Plantains* that occurs. Landing did not seem possible at the time of the writer's visit, nor was it necessary; the bay, which was visited several times, was reached by cutting a path through the jungle from Anchorage Bay. It is of course possible, though hardly likely, that the individuals who introduced the *Plantains* also cut such a path.

To the south-east of the oblong spit, and therefore on the east side of the island, is a third, much wider bight, three-quarters of a mile from cape to cape, but only receding a furlong and a half. The northern half of this bay, bounded by the hilly spit, is overlooked by steep hill-sides ending in cliffs that, though not lofty, are particularly abrupt. The southern half, limited by the main island-mass, has a beach of rounded boulders; behind this is a straggling sea-fence in which stands a solitary coco-nut tree; a narrow belt of true beach-forest lies beyond. It was with little expectation of being able to land that we put into this bay; we were therefore agreeably surprised to find that—at least at the time of our visit, the end of March—not only could a landing be made without difficulty, but that the bay afforded a more comfortable anchorage than Anchorage Bay itself. The boulder beach slopes rather gradually outwards, and is of a considerable width; probably therefore the surf here is very strong during the north-east monsoon. That the sea-fence is here irregular and thin is no doubt due partly to the surf, and partly to the fact that it has an insecure root-hold among the rounded stones that are piled behind the beach into an embankment which protects the forest beyond. This beach-forest occupies a strip of level land that stretches backwards from 50 to 100 yards to the base of the main hill. Three gorges debouch on this level area and have filled up the interstices of the old beach with the soil on which the trees grow. At the mouth of one of these ravines there is a gap in the beach-forest occupied by a small depression that in March is covered with only a coating of fine sun-cracked mud, but in the rains evidently forms a small lagoon; this appears to be the only spot in the island where water ever lodges.

Though entirely volcanic in structure there is no indication at the summit or elsewhere that the island has recently been active. There is no crater at the top[*], and his examination led the writer to think, not that all traces of craterine shape have been obliterated by long erosion, but that there never has been any crater on the peak. The local features, coupled with the nature of the rocks that constitute the island,[†] appear to indicate that originally Narcondam may have been a volcano, produced, like the volcano that appeared on the Island of Camiguin in July 1871,* by the extrusion of viscid lava without the accompaniment of crater-forming materials. In any case, the depth of the ravines that plough the flanks of the hill on every side indicates very clearly how remote has been the period of the island's activity.†

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[*] Mallet: Memoirs of the Geol. Survey of India, xxi, 281.

[†] Ball: Records of the Geol. Survey of India, vi, 90, only mentions a bed of volcanic agglomerate, (of which several crop out round the coast), at Coco Bay, wherein are embedded trachytic boulders. Mallet—Memoirs of the Geol. Survey of India xxi, 281–283—describes the Narcondam lavas as " compact, or very slightly vesicular " lavas in which crystals of white translucent felspar, and black or dark-brown " hornblende, are disseminated through a ground-mass which is (generally light) " grey in unaltered specimens, but pale red in those that have undergone weathering " and in which the iron has been peroxidised." Farther on, Mallet remarks:—" The " lavas of Narcondam are essentially hornblende andesites, and are of a decidedly " more acid character than those of Barren Island." This character, of acidity

The top of the island is frequently bathed in cloud;‡ during the ten days spent in the island in 1891, this cloud-cap seemed to envelope, for the greater part of the day, the last 400 feet of the peak. The appearance, however, was slightly deceptive; for it was noticed that the cloud was only condensed on the western aspect of the hill, and that towards evening the peak always became clear. The nature of the vegetation on the peak,—the trees bearded with moss, and their bark covered with *Trichomanes*—indicates clearly that this is a usual state of affairs.

Save on the sea-cliffs, which are bare, and on the eastern side of the peak near the top, where the jungle is thin and scrubby, the whole island is clothed with dense forest: this consists mainly of lofty trees, with but few climbers, in the beds of the various watercourses. On the intervening ridges the vegetation consists of a tangled mass of shrubby growth overloaded with creepers. Landing at Anchorage Bay one finds on the shingle some plants of *Ipomæa biloba;* immediately behind the shingle, and under the shade of about a dozen coco-nut trees, is an attempt at a sea-fence, composed of *Scævola Koenigii, Hibiscus tiliaceus, Morinda bracteata, Guettarda speciosa, Pandanus odoratissimus;* some *Ipomæa grandiflora, Convolvulus parviflorus,* and *Wedelia scandens* climb over these. Behind these bushes some trees of *Barringtonia speciosa, Terminalia Catappa, Erythrina indica, Sterculia rubiginosa, Thespesia populnea, Dracæna angustifolia, Ardisia humilis,* and *Ixora brunnescens* represent the beach-forest. There is, however, but scanty room for species of either class, and a few plants of *Eranthemum succifolium* underneath the trees complete the representation of this sort of vegetation in this situation. To the south of this point are some low cliffs, covered at the top with a tangled mass of *Hoya orbiculata,* while at their base plants of *Pluchea indica, Blumea glomerata, Vernonia divergens, Desmodium polycarpon, Cyperus pennatus,* and *Thysanolæna acarifera* occur; the last-named,—it is, by the way, the only grass that is found on the island—is the most plentiful and seems to be, besides *Fimbristylis ferruginea* and *Boerhaavia*

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strongly supports the conclusion (to which Mallet also inclines) that there never was a crater in Narcondam, and that the island is of the endogenous volcanic type.

* Moseley: "Notes by a Naturalist on the 'Challenger,'" p. 409.

† Mallet: Memoirs of the Geol. Survey of India, xxi, 284.

‡ Ball: Records of the Geol. Survey of India, vi 89.

repens, about the only species that occurs on the rocky sea-cliffs. On the small islet in Anchorage Bay and on the rocks to the north of the reef that connects it with the main island, is a scrubby jungle of *Hibiscus tiliaceus*, *Acacia concinna*, *Dalbergia monosperma*, *Premna integrifolia*, *Glochidion calocarpum*, *Breynia rhamnoides*, *Blachia andamanica*, and *Gelonium bifarium*,—the last-named especially plentiful.

In the denser interior jungle on the hill between Anchorage Bay and the gorge that debouches at Coco Bay, one is struck by the familiar Andaman feature of groves of gregarious Euphorbiaceous treelets forming an under-growth in a forest of lofty trees. Of this forest, *Ficus nitida* and *Ficus Rumphii* are perhaps the chief constituents; the two commonest gregarious species are *Actephila excelsa*—undoubtedly the species on the island represented by the greatest number of individuals, and *Mallotus andamanicus*—also, in many places, very plentiful. The herbaceous species found underneath these treelets are mainly two ferns: *Acrostichum appendiculatum*, which is not very plentiful, and *Asplenium urophyllum*, which is. Among other species, found chiefly on a comparatively level tract on the top of the ridge, where the gregarious feature noted during the ascent from the east coast gives place to a mixed forest, the undergrowth includes *Alsodeia bengalensis*, *Cansjera Rheedei*, *Glycosmis pentaphylla*, *Capparis sepiaria*, *Pisonia aculleata*, *Vitis lanceolaria*, *Leea sambucina*, *Memecylon edule*, *Abrus precatorius*, *Mucuna gigantea*, *Bridelia tomentosa*, *Ficus hispida*; *Acrostichum appendiculatum* is here common, while *Asplenium urophyllum* is rare. The trees are also more mixed, and include, besides the two species of *Ficus* already mentioned, a *Bombax*, *Erioglossum edule*, *Diospyros Kurzii*, *Oroxylum indicum*, *Artocarpus Lacoocha*, *Antiaris toxicaria*, *Ficus comosa*, and *Amoora decandra*. Besides the two ferns mentioned, a not infrequent herbaceous species is a fine *Amorphophallus*. Along the ravine that passes northward to debouch at Coco Bay occur the same species; near its mouth, where the ground is flat, the jungle becomes 'scrub'—*Morinda*, *Premna*, and such like shrubs, loaded with tangled masses of *Ipomœa vitifolia*. This type of jungle takes the place of the absent beach-forest; the sea-fence is however well-developed, and is of the usual Malayan type,—*Pandanus*, *Guettarda*, *Morinda*, *Hibiscus tiliaceus*, *Cæsalpinia Bonducella*, *Colubrina asiatica*, *Allophylus Cobbe*, *Vigna lutea*, *Canavalia turgida*, and such like plants. Round this bay the coco-nut zone is well developed; behind it is the plantain grove already referred to.

East Bay, visited subsequently, may be here most conveniently described. On the beach occur both *Ipomœa denticulata* and *Ipomœa biloba*; along with these occur *Vigna lutea* and *Phaseolus adenanthus*; the sea-fence is represented by a few examples of *Pandanus odoratissimus*, *Hibiscus tiliaceus*, *Capparis tenera*, *Colubrina asiatica* and *Clerodendron inerme*. The true beach-forest, here well developed, contains much *Pisonia excelsa*, with a number of trees of the far less common *Pisonia alba;* the other trees of the zone are *Terminalia Catappa*, *Calophyllum inophyllum*, *Thespesia populnea*, *Gyrocarpus Jacquinii*, *Ixora brunnescens*, *Ficus brevicuspis*, *Ficus callosa*, *Odina Wodier*, and *Garuga pinnata* ; the two last-named, though commonest in, are not confined to this zone. The single coco-nut tree mentioned as occurring here has probably grown from a nut drifted round from the other bay ; at Coco Bay, however, it is more probable, considering their association with plantains that the trees have been introduced intentionally.* The edges and bed of the dry lagoon already described were covered with *Ipomœa Turpethum*.

Along the edge of the cliff overlooking the west side of Coco Bay some species, not seen elsewhere, were met with : *Entada scandens*, *Acacia concinna*, a *Grewia* (in leaf only, perhaps *G lævigata*), a *Tylophora* (in fruit only, perhaps *T. globifera*), *Pæderia fœtida*, and *Dioscorea sativa*. The steep hill-side overlooking the northern part of Anchorage Bay is covered with a scrub-jungle of *Premna*, *Breynia*, and such like shrubs, with a good deal of *Capparis sepiaria*. All over this hill were seen withered leaves of the *Amorphophallus*.† The hill-side overlooking the southern portion of Anchorage Bay is covered with the same dense forest, mainly *Ficus*, but has for its undergrowth quantities of *Caryota mitis*, with dense patches of *Pollia Aclisia* underneath.

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* These coco-nuts are too old and too numerous to have been introduced of recent years ; it seems strange, therefore, that they have never before been mentioned. The recorded visits to Narcondam are :—(1). That of Messrs. Hume and Ball in 1873, when a landing was effected, and no more ; (2). that of Messrs. Mallet and Hobday in 1884, when four days were spent in investigating its geology and topography, and an ascent, probably the first, was made of the peak ; (3). the present visit, when the peak was again ascended. The account of their landing-place shows that it was at Coco Bay that Ball and Hume landed ; at no other bay is there shoal water. Ball mentions some of the plants noticed by him at this place, but neither he nor Hume have recorded the existence of coco-nuts and plantains. Mallet is equally silent, his paper being rigidly confined to the topography and geology of the island. Though these are the only recorded visits, there have been others paid to the island. Hume (*Stray Feathers* ii, 110) mentions a visit by Col. Tytler. Again, Kurz (*Report on the Vegetation of the Andamans*, p. 13.) mentions a deputation that visited Barren Island in 1866, in search of pasture-grasses ; from specimens in the Calcutta Herbarium, however, we learn that this deputation a few days later visited Narcondam and the Coco Group. In connection with the systematic list, occasion will be taken to refer to the acts of the deputation in question : it is sufficient to say here that to its members is probably due the merit of having introduced, *at least* the plantains, and perhaps also the coco-nuts. This would make it certain that both species were present at the time of Hume's visit.

† Corms and seeds of this plant were brought to the Royal Botanic Gardens, Calcutta, where it has sent up leaves and has flowered.

The ridges between the gorges are tolerably uniform in the nature of their vegetation; *Premna integrifolia* extends a good way up, *Morinda bracteata* is found throughout the island and is as common at the top as it is on the coast; *Trema amboinensis, Capparis sepiaria*, and *Acacia concinna*, are common species; not infrequent is *Callicarpa arborea*, though far less common here than on Barren Island. In the gorges patches of *Macaranga Tanarius, Trema amboinensis, Pipturus velutinus, Bœhmeria malabarica*, as gregarious species, are common, and form, especially in the lower part of the hill, the prevalent undergrowth. The trees are those already enumerated, but as additional species, may be mentioned the following, all obtained in the gorge leading from Anchorage Bay to the summit of the peak:—*Amoora Rohituka, Apodytes andamanica, Semecarpus heterophylla, Myristica glauca, Ficus glaberrima*—the last mentioned a small tree, at about 2000 feet elevation. The climbers not previously noted were *Anamirta Cocculus*, frequent; *Antitaxis calocarpa*, very common; *Aristolochia Tagala; Gouania leptostachya; Trichosanthes palmata; Anodendron paniculatum; Dischidia nummularia; Pothos scandens*, and *Strychnos acuminata*, at about 1200 feet elevation. The herbaceous species not before observed were *Blumea myriocephala*, only once at about 1600 feet elevation; *Asplenium nidus*, seen on trees throughout the ascent; *Nephrodium terminans*, not common below 1000 feet, very frequent above that height; *Davallia speluncæ*, here and there throughout the ascent, *Polypodium irioides*, at about 1800 feet elevation; *Polypodium adnascens*, on trees throughout the island, not common; *Bryum coronatum*.

As the summit is neared, and one passes within the area usually moistened by the cloud-cap, the trees are covered with moss (*Neckera rugulosa*), and bear on their bark quantities of *Trichomanes pyxidiferum*. In other respects the jungle on the top does not differ from that lower down, except that, owing to the ridges being of necessity greater in proportion to the gorges than lower down the hill, there is relatively more of scrub jungle than one finds below.

Few *Fungi* were obtained during the visit: doubtless the season of the year was unfavourable. No *Algæ* were found either on the rocks or washed up on the beaches. The ocean-drifts consisted almost entirely of fruits or seeds of species that occur on the island; the only exception noted was a fruit of *Heritiera littoralis* found at East Bay.

Barren Island is situated in the Andaman Sea, in Lat. 12° 15′ N. and Lon. 93° 50′ E., 60 miles to the east of Middle Andaman, 74 miles south-south-west of Narcondam, 80 miles north-north-east of Flat Rock (a submarine peak that reaches the surface, but no more, in Lat. 11° 12′ N. and Lon. 93° 36′ E.), and 320 miles due west of Mergui. As shown in the subjoined table, the island, like Narcondam, rises abruptly out of deep water, especially on its eastern, western and northern sides, to a height of 8000 feet or more* above the floor of the Andaman Sea.

TABLE II.—*Soundings in the vicinity of* Barren Island.

GENERAL DIRECTION OF LINE OF SOUNDINGS.	DISTANCE IN MILES FROM CENTRAL CONE.	DEPTH OF SOUNDING IN FATHOMS.
E. S. E.	1¼ (¼ mile from shore).	118
E. S. E.	2¼	433
E. S. E.	3¼	641
E. S. E.	100	1260
N. N. E.	1¼ (½ mile from shore).	217
N. N. E.	2¼	545
N. N. E.	3¾	782
N.	1½	325
N.	25½	1,140
W. N. W.	1¼ (½ mile from shore).	180
W. N. W.	2¼	456
W. N. W.	4½	655
W. N. W.	45	1159
W.	1⅜	169
W.	30	1130
S. S. W.	1⅜ (⅜ mile from shore).	47
S. S. W.	3¼	238
S. S. W.	4½	413

Physiographical accounts of this island have been given by Ball† and Mallet‡ in whose papers a précis of previous information is also contained; a brief description is therefore all that is here necessary.

Nearly circular in outline and about two miles in diameter, the island consists of a huge crater, of which the mouth is a mile wide and the rim is from three-quarters of a mile thick at the base—throughout its southern half, where it is from 920 to 1160 feet high—to barely half-a-mile thick—along the north where its height is from 630 to 790 feet. The rim is further breached to below sea-level on the west side by a part of the original hill having been at one time blown away, the resulting gap being about a-quarter of a mile wide. In the middle of the amphitheatre that results, and therefore about a-quarter of a mile to the north of the centre of the island, a newer perfect volcanic cone rises to a height of 1015 feet. At the top there is an ovoid crater, somewhat straighter along its northern than its southern edge, and somewhat higher on these edges than at either extremity. The edges mentioned are nearly 80 feet above the bottom of the cup which is itself sub-divided into two parts. The western, somewhat irregular, is full of loose lava fragments, and has its floor nearly 40 feet higher than the other, which is an almost perfect circle, about 20 yards wide, with a floor of smooth soft sand. At the west end the rim of the crater is about 40 feet lower than along the north and south edges, and is thus very little above the floor of the minor western depression. In the middle of this dip the rim carries a huge lava block, about 20 feet long, 10 ft. wide, and nearly 20 feet high.* This block forms a striking object on the cone as seen from the landing-place. At the eastern end of the crater the rim dips even more, and is about 60 feet below the level of the northern and southern edges, or just over 20 feet above the floor; the edge is here narrower than elsewhere. In and about the crater are several solfataras with crevices whence steam escapes.

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* Mallet and Carpenter: Records of the Geol. Survey of India, xx, 46, (*footnote*).

† Ball: Records of the Geol. Survey of India, vi, 81.

‡ Mallet: Memoirs of the Geol. Survey of India, 251, *et. seq*.

The cone itself consists of volcanic ashes, fairly firm on the south, east and north sides, but loose and friable on the western face. The slope is very uniform, being about 30° on every side. The valley between the cones contains, at the base of the inner, two lava streams that have flowed to the sea through the breach in the outer; of these streams the northern overlies the southern. There has also been a third flow to the east, this does not, however, come in contact with either of the others. The sea, it may be remarked, does not enter the breach in the outer cone, the breach, as well as the valley between the cones, being filled to above sea-level by the products of the newer volcano.

The seaward slope of the outer cone is much steeper in the northern than in the southern part of the island, and is furrowed by many nearly meridional ravines, difficult of access where they enter the sea, but more easily traversed further up. The slope of this half of the ancient crater towards the newer volcano is, on the other hand, even and rounded, consisting for the main part of bare, loose black ash, derived from the inner cone. The inner slope of the southern half of the original volcano is, on the other hand, except at its base, steeply precipitous; the seaward slope of this half, besides being much more gradual than that of the northern half, shows a second subconcentric ridge separated from the true rim by a gorge that debouches on the east side of the island. Gorge and ridge owe their origin, however,—like the ridge and ravine of the same nature, but of more imposing proportions, that occur at the south end of Narcondam—to subaërial denudation, not to volcanic action.

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* The measurements (Mallet: Memoirs of the Geol. Survey of India, xxi, 267) are:—Length, 22 feet; breadth, 11 feet, height, 13 to 19 feet. The greatest height is at the west end, where it is also narrowest; its most striking aspect is to the spectator on the beach at the landing-place, to whom it looks like a huge tooth.

The excentric position of the newer cone, with the lesser relative height, and the steeper seaward slope of the northern half of the original crater, seems to point to subsidence of that half. Perhaps the explosive eruption which effected the breach to the west may have had some connection, direct or indirect, with this subsidence. The volcano represented by the outer cone was doubtless at one time much higher than it is now.

At the landing-place in the breach there is a hot spring on the beach; the temperature of this spring is steadily falling, and at the time of the writer's visit was 106° F.[*] The spring doubtless only represents percolation of rain water through the heated newer materials—the inner cone and lava streams—contained within the circuit of the ancient crater.[†]

The anchorage in the bay at the breach is of the most uncomfortable description; the safest anchorage is opposite a small bay with a sandy beach, a *Pandanus* sea-fence and a line of Coco-nut trees, on the south-west side of the island. Landing by boat is, however, usually quite easy on the beach at the hot spring to the north of the point where the lava stream falls into the sea; the surf that rolls into Anchorage Bay must make it impossible, as a rule, to land there.

At Landing Bay the boulders and stones on the beach, bathed by the water of the hot-spring, are covered by a species of *Calothrix* which occurs in considerable quantities. Another, *Alga*, also a *Calothrix*, was obtained from bare rocks in one of the gorges; no marine *Algæ* were seen. On the beach itself, behind a small bed of drift, are some examples of *Ipomœa biloba*; the drift contained, in addition to fruits and seeds of species noticed in the island, fruits of *Barringtonia speciosa* and of *Heritiera littoralis*.[‡] Close to the beach and to the lava flow is an example of *Pongamia glabra*; a little further inland to the north of the lava is a considerable grove of *Flueggia microcarpa*, with quantities of *Mitreola oldenlandioides*, in the sandy soil beneath. Beyond this grove is a thicket of *Mussuenda macrophylla*—the accident of its situation has converted the species into a straggling shrub and imparted to it a very distinct facies. On the lava itself nothing grows, though further inland and to the south of the stream it is in several places partially covered by beds of *Aganosma marginata*, which, rooted in the adjacent soil, and having no trees on which to climb, prefers sprawling over the bare black lava to spreading along the ground among the grass. This grass, *Ischæmum muticum*, almost completely occupies the plain between the lava flow and the inner wall of the outer cone, which is thus a great meadow in which, however, there are some patches of scrub jungle, the chief constituents being *Dodonæa viscosa*, *Flueggia microcarpa*, *Gelonium bifarium*, *Phyllanthus reticulatus*, *Trema amboinensis*, *Dalbergia tamarindifolia*, and stunted examples of *Callicarpa arborea*.

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[*] Prain: Proceedings As. Soc., Bengal, 1891, p. 84.

[†] Mallet: Memoirs of the Geol. Survey of India, xxi, 274.

[‡] *Barringtonia speciosa* occurs in Narcondam, and it may possibly also occur at some of the bays on the south-west and south of Barren Island, where the surf made landing impracticable. But *Heritiera littoralis*, the fruits of which were collected in Narcondam also, does not seem to occur in either island.

The inner cone is merely a "cinder-heap," with hardly any vegetation; a few very stunted examples of *Trema amboinensis* on its southern face, about 650 feet up, and small shrivelled tussocks of *Fimbristylis ferruginea* scattered unevenly over all the sides except the western, being the only plants present. The interior of the crater has more vegetation than the whole outside of the cone; near the crevices in the inner wall, and especially on the south side where the soil is moistened by the condensation of escaping steam, occur *Nephrolepis tuberosa* (also obtained elsewhere in the island), *Cheilanthes tenuifolia* (very small and stunted specimens), *Lycopodium cernuum* (all over the stones in the western, more shallow depression of the crater), *Psilotum triquetrum* (also found in Java, on the crater of Gunong Boddas Preanger, by H. O. Forbes), *Pholidota imbricata*, *Vandellia crustacea* and *Oldenlandia corymbosa*; in the sand at the bottom of the deeper eastern craterine depression occur luxuriant patches of *Fimbristylis ferruginea*.

An attempt was made to land at Anchorage Bay; owing, however, to the heavy surf that rolls in this was found to be impossible. The beach in this bay is sandy; behind it could be seen the usual sea-fence of *Pandanus*, a species seen nowhere else on the island. Just within the *Pandanus* fence rise 13 coco-nut trees tall enough to be seen and counted. Judging from the analagous beaches in the Coco Group and Narcondam it may be anticipated that there are many seedlings besides. To verify this surmise an attempt was made later on to cross the outer cone from the amphitheatre and work down to this beach. The attempt did not succeed; the sea was reached at a point too far to the east and the attempt was not considered worth repeating.* Rowing round the island a landing-place was looked for in bay after bay; to no purpose, however, the heavy south-western swell surged on their beaches in breakers so huge that any attempt to land was precluded. On the east, north, and north-west sides however, landings were effected; in the first case the crest of the outer rim was attained at a point where further progress was barred by its precipitous nature. By the gorge entered from the north it was found impossible even to reach the crest; the north-west landing, after some difficult climbing, led to the edge of the outer cone and permitted an easy descent into the amphitheatre.

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* Those who have been engaged in similar work will understand how difficult it is under such circumstances to strike the proper ridge or ravine. The results of the journey, which it took a day to accomplish, were not sufficiently remunerative

The inner walls of the outer cone, where too steep for trees and shrubs, are densely and evenly clothed with *Pogonatherum saccharoideum*, along with which are associated patches of *Desmodium polycarpon*, *Onychium auratum*, *Pteris biaurita*, *Nephrolepis tuberosa* (found also within the crater), and *Fimbristylis diphylla*. On one somewhat damp spot, where there had been recently a small landslip, were found, on the otherwise bare soil, some plants of *Pteris longifolia*, *Oplismenus Burmanni*, *Physalis minima* and *Vandellia crustacea* (this last was also obtained inside the crater). On the inner northern wall of the outer cone, which is heaped with ashes, there is hardly more vegetation than on the inner cone itself, the only species that grows being the *Fimbristylis* found on the cone. At the base of the cliff which forms the inner southern wall there is a uniform but not very dense forest the commonest species in which are *Terminalia Catappa* (certainly the most abundant tree on the island), *Eugenia Jambolana* and *Callicarpa arborea* (both very common), *Semecarpus heterophylla*, *Garuga pinnata*, *Ixora cuneifolia*, *Ardisia humilis*, *Oroxylum indicum*, *Macaranga Tanarius*, *Trema amboinensis*. Quite a feature is the extent to which a wild vine, *Vitis repens*, prevails in this area; among other creepers noted were *Cyclea peltata* (not seen in Narcondam), *Abrus precatorius*, and two *Dioscoreas* (only one apparently occurring in Narcondam). Another noteworthy feature of this forest is the presence, though not in great quantity, of a species of *Dendrobrium*. The bare rocks in the gorges over which water in the rains must pour in cascades are here and there covered with dried-up masses of fresh-water *Alga*, *Calothrix tasmanica*.

The forest on the outside of the outer cone is much like that just described though the trees are more weather-beaten. The species present inside are all met with outside also, but though *Terminalia Catappa* is still undoubtedly the most plentiful tree, and there are many

considering the limited time at the writer's disposal, to justify another attempt. The majority of the gorges on the south side of the Island have an eastward tendency, and are thus unlike those in the north side which are more truly radial; this circumstance led to the selection of a point for descent too far along the rim.

examples of *Ficus Rumphii* and *Ficus nitida*, with a considerable number of *Ficus cuspidifera*. The two *Dioscoreas* are very common climbers; *Capparis sepiaria* is exceedingly common as a climber, or rather as an under-shrub, in the forest; *Gloriosa superba* was seen in the sea-face jungle on the east side of the island; *Adiantun lunulatum*, another species not seen in Narcondam, is very common on the outside of the outer cone. On bare rocks near the sea *Boerhaavia repens* is plentiful, and species of the littoral class noted at the points where landings were effected include *Hibiscus tiliaceus*, *Sterculia rubiginosa*, *Colubrina asiatica*, *Ixora brunnescens*, *Pluchea indica*, *Wedelia scandens*, *Scævola Koenigii*, *Premna integrifolia*, *Glochidion calocarpum*, *Gelonium bifarium*. *Terminalia Catappa*, a truly littoral species, spreads here from base to top of the outer cone; the same is true of *Morinda bracteata*, another plentiful sea-coast species. *Cocos* and *Pandanus* have been already mentioned as occurring only at Anchorage Bay.

The question regarding the Coco-nut trees on Barren Island is somewhat simpler than in the case of Narcondam, for they have not been deliberately planted: at the same time it cannot be contended that they afford an unequivocal instance of introduction by the sea. It is not clear that any one has ever landed at Anchorage Bay ;* it is certain that for the greater part of the year, to attempt to do so would be very dangerous. At the same time when ships call they usually anchor at this place, and it is not improbable that during some such visit a coco-nut dropping overboard has been washed ashore and germinated in the drift collected by the roots of the sea-fence. Man indirectly, rather than the sea, may therefore be supposed to have been the introducing agent.

Fungi were as scarce on Barren Island as in Narcondam, and the only moss met with was *Bryum coronatum*.

To complete the account of these islands mention must be made of Flat Rock, situated, as has been already mentioned, in Lat. 11° 12′ N., and Lon. 93° 86′ E., 80 miles south-south-west of Barren Island, 50 miles east-south-east of Rutland Island, and the same distance due east of the opening, Duncan Passage, between Rutland Island and Little Andaman. The rock appears above the surface, and no more; but though so much smaller as a subaërial peak than Barren Island or Narcondam, as a submarine peak it is evidently larger than either, since its summit appears as a long narrow bank that carries from 15 to 80 fathoms of water; this bank does not extend to the east or the west for more than two miles from the Rock, but towards the south extends at least 10 miles, to the north more than 20 miles. Beyond the edge of this bank—the Invisible Bank of the Admiralty maps—the lead sinks at once into deeper water. The Bank itself has been carefully surveyed but of the absolute depths of the soundings just beyond we know little or nothing, so that though this survey is invaluable to navigators, from a hydrographical point of view it leaves much to be desired. Meagre however as its details are it shows that the soundings are deeper towards the east, south, and west than they are towards the north. The following TABLE indicates the soundings shown in the Admiralty maps :—

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* From the *Report* of the Andamans' Committee already referred to (*Proceedings, As. Soc Bengal*, 1866, p. 215), it would appear that their experience was quite that of the writer. The passage is interesting and is worth quoting *verbatim* :—"The only "place where there seemed any chance, was on the south-west, where a small "sandy beach, with a heavy surf running, was discovered, *above which four old "cocoa-nut trees were seen.* A boat was sent towards the shore and got bottom at 35 "fathoms, but as we had not much time to spare, the whole of the ground could "not be gone over, * * *." The italics are the writer's; the passage will be referred to again in the systematic list of the plants collected. It is strange that though from the year 1866 onwards these coco-nut trees have been used as the guide-mark to the safest anchorage on the coast of this island, neither Hume, Ball nor Mallet, in their accounts of the island, have noted their presence.

TABLE III.—*Soundings in the vicinity of* Flat Rock.

GENERAL DIRECTION OF LINE OF SOUNDINGS.	DISTANCE IN MILES FROM ROCK.	DEPTH IN FATHOMS.
N. N. E.	1	14
N. N. E.	10	25
N. N. E.	13	27
N.	5	38
N.	15	80
N. W.	5	16
N. W.	10	59
N. W.	15	168
W	10	90 (no bottom.)
W.	35	500
S. W.	3½	78
S. S. W.	8	35
S. S. W.	16	200 (no bottom.)
S. E.	2	16
S. E.	7	48
S. E.	12	200 (no bottom.)

Along the east side of the bank none of the soundings made have touched bottom, but they show that the edge drops into deep water within 5 miles of a line running from south-south-west to north-north-east through the rock; along this line the soundings show a rather sharp ridge with relatively shallower soundings for the whole length of the bank; this line, it is hardly necessary to repeat, is that on which both Narcondam and Barren Island also show their shallowest soundings, while the axes of all three islands indicated by this direction form very nearly a continuous straight line.

The nature of the bottom on this bank is only mentioned in the case of one sounding; this depth, 25 fathoms, gives, as might be expected, coral: it would be interesting to ascertain whether the subaerial portion, Flat Rock itself, is part of a raised coral reef, or a remnant of an originally larger island of volcanic structure. Raised coral reefs occur in the Andamans to the west, and in the Nicobars to the south; it may therefore be anticipated that here it will be found that the subaerial portion of the bank is weathered coral; at the same time it would be more satisfactory to have the question settled by a visit to the rock. Reasoning from analogy, however, there is little doubt that the basis of this coral bank is a submarine volcanic peak, and that it forms but one of a series to which the others also belong.

Our knowledge of the bottom-contour of the Andaman Sea is not so satisfactory as is that of the Sea of Bengal. English geographers give no attention to the point; German geographers have mapped the sea somewhat hastily and from rather meagre data. Thus Berghaus indicates by the contour lines in a map of "Heights and Depths"* that a deep gap, connecting the Sea of Bengal and the Andaman Sea, exists between Achin Head in Sumatra and the Nicobars. It has however long been known that the ridge in this channel carries only 760 fathoms of water. In a larger map † Berghaus shows deep water as overlying not only the ridge between the Nicobars and Sumatra, but also over that between the Andamans and Nicobars and, what is quite unaccountable, between Preparis and the Coco Group; this last channel has long been known to carry no more than 150 fathoms. As regards that between Little Andaman and the Nicobars, Carpenter had, on grounds of temperature, predicted what Hoskyn has since shown to be true, that the ridge under it could carry at the utmost 740 fathoms; its actual depth is 736 fathoms. In this map also two soundings are shown in the meridian of Lon. 96° 10′ E., one of them in Lat. 11° 35′ N., for which 2300 fathoms are indicated; the other in Lat. 12° 30′ N. gives 2097 fathoms. These soundings appear to be devoid of authority; at all events they are quite wrong.*

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* Stieler's Hand Atlas, Sheet 8, dated 1878.

† Stieler's Hand Atlas, Sheet 67, dated 1881 and revised to 1884; scale 1 : 12,500,000. Perhaps the contour line in this map means the 100 fathom line; this would explain the shading in the straits mentioned. If so, it is too far from land, and coincides with the 1000 fathom line rather than the 100 fathom one.

A more reliable map is, however, to be found in the same work.† This map, designed by Petermann and drawn by Habenicht, is, unfortunately for our purpose, on a smaller scale than Berghaus' map. It shows Carpenter's Ridge jutting southward into the 2000 fathom line immediately to the west of the Andamans; shows comparatively shallow water (between the 100 and the 1000 fathom lines), in the two channels between the Andamans and Sumatra, and indicates a depth of 1137 fathoms in Lon. 96° 11′ E. and in Lat. 12° 24′ N.—practically the situation of Berghaus' 2097 fathom mark; this sounding indicated by Petermann has the advantage of being a real one. Going further into detail however, one finds that not even Petermann's map gives any idea of the true state of affairs within this sea.‡ For the 1000 fathom line is there shewn as enclosing a long and narrow trough half way between the Andamans and Tenasserim; the three peaks that have just been described are therefore shown as springing from a slope that trends upwards from the bottom of this trough to the Andaman ridge. Instead, however, of indicating a line to the eastward of these peaks the 1000 fathom line passes westward between Narcondam and Barren Island to within 30 miles of the east coast of Middle Andaman, where soundings of 1130 and 1159 fathoms have been obtained; these, it may be remarked, close inshore though they be, have proved (with the exception of a veritable sounding of 1284 fathoms 50 miles east of little Nicobar, and of a doubtful sounding that gives 1260 fathoms with no bottom in Lon. 95° 30′ E, and Lat. 11° 45′ N.) the deepest soundings yet obtained in the Andaman Sea, and are more than 100 fathoms deeper than the deepest indicated along the line that connects Barren Island with Narcondam.

There is no doubt that taken collectively these three peaks indicate a northward continuation of the line of volcanic activity known as the "Sunda Range," which stretches up from Sambawa and Flores through Java and Sumatra at least to Barren Island. Von Buch in his work on volcanoes did not carry the chain beyond Barren Island, but Griffith, who in passing Narcondam recognised its volcanic nature, suggested to McClelland that here might be seen a northward extension of the same chain. McClelland not only adopted the suggestion but sought a still further extension to the north, in the mud-volcanoes of Ramri and Cheduba, off the Arracan coast;* and other writers, such as Daubeny, Scrope, Mrs. Somerville and Mallett † have adopted the same view.

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* In a previous paper (*Journ. As. Soc. Beng.* lx. pt. 2, p. 284) the writer was misled by these soundings, which he supposed to have some foundation, into giving the depth of the Andaman Sea as over 2,000 fathoms.

† Stieler's Hand Atlas, Sheet 58, dated 1884; scale 1 : 30,000,000.

‡ In criticising these maps the writer would wish it understood that it is from no desire to cavil that he points out their defects; it is only because they are worthy of criticism that reference is made to them. Except the Admiralty maps, which are above reproach, no English map with which the writer is acquainted deserves to be mentioned alongside of those in Stieler's work.

Ramri and Cheduba lie to the west of a tertiary ridge that composes the Yomah of Arracan, which, in the latitude of Ramri, reaches a height of 4,000 feet. This range is continued southward into and beyond the Andaman group. Thus it passes through Diamond Island to the Alguada reef, beyond this, across a channel less than 60 fathoms deep, to Preparis, and again across another of 150 fathoms to the Coco Group, Great Andaman and Little Andaman. It would appear after this to pass to the westward of the Nicobars, though its precise relationship to that group has not yet been made clear; finally it reappears, not in Sumatra, but in a long line of islands—the Nias group—that stretches south-eastward along the western coast of Sumatra.‡ The line of volcanic activity to which Barren Island and Narcondam presumably belong, lies from Narcondam southwards to the east of this tertiary ridge; if, therefore, Ramri and Cheduba belong to the same line, we have to believe that, after continuing for the whole length of Sumatra and the Andamans parallel to this ridge, the volcanic line at its northern end, where its activity is weaker than elsewhere, crosses the tertiary formations where they have become thicker and stronger. This is in itself a proposition, the truth of which is so hard to accept, that when Blanford§ suggests that the true northern continuation of the Sunda volcanic range is to be found in the extinct Burmese volcano of Popah, and the extinct Yunnan one of Han-shuen-shan, we realise that he must be right, and are surprised that, after all, Mallet is inclined, in a modified sense, to favour the earlier view.|| The volcanoes of Ramri are of a different type from those of the Sunda Range; they belong to a series of gas vents, all of the same general character, though none of them so active as the Ramri ones. The Sitakund in Chittagong,

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* McClelland, Journ. As. Soc. Beng., vii., 77.

† Mallet does this (Records of the Geol. Survey of India, xi., 203) in a different sense from the earlier writers; they, owing to a want of definiteness in the accounts on which they relied, mistook the "gas" volcanoes of the Arracan Coast for true "steam" volcanoes.

‡ Kurz: Journ. As. Soc. Beng., xlv., pt. 2, 105.

§ Manual of the Geology of India, iii., 725.

|| Mallet: Memoirs of the Geol. Survey of India, xxi., 253.

and the various hot-springs in the valley of Assam, like those in the Namba Forest,[*] are examples of this series, which forms a continuous line parallel on its western side to the tertiary ridge referred to, just as the true volcanoes, to the line of which Barren Island, Narcondam and Popah belong, are parallel to it on the east.[†]

Whether they belong to that particular group of volcanoes known as the Sunda Range, or not, there is no doubt that Narcondam and Barren Island belong to the general volcanic system extending from the Kuriles, through Japan and the Philippines, to Malaya—a system of which the Sunda Range itself forms but a portion. Like the other members of this system, these peaks are situated, not on, but just within, the margin of the continental elevation forming Eastern and South-Eastern Asia, wherever this rises abruptly from great ocean-depths; the main difference between them and most of the peaks of the system is that, whereas the space between the edge of the continental area and the line of volcanic activity is in other cases sub-aërial, that space is here for the most part sub-marine. This space forms, in the case of Sumatra, the main body of the island—the volcanic line being much nearer the eastern margin—and the rocks of which it is composed include all those that go to form the islands of the Nicobar Group ; these rocks appear once more, not in the main chain of the Andamans, but in the small islands to the east of South Andaman (north east of Port Blair), known as "The Archipelago."[‡] Neither in, nor opposite, the Nicobars is there any trace of the complementary volcanic ridge; to the east of this "Archipelago," however, it is indicated by Flat Rock and Barren Island.

Not only is the volcanic line of Sumatra absent from the Nicobars, but no trace has yet been found in that group of the sandstones of the Arracan hills, which are prolonged into the main chain of the Andamans and which re-appear in the Nias. The result, therefore, is that the Arracan-Sumatra chain, in place of constituting a single ridge consists of two—a western tertiary ridge most marked in the north and tailing off towards the south, and an eastern volcanic ridge most marked in the south and dwindling into insignificance northwards.

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[*] Prain : *Proceedings As. Soc. Bengal*, 1887, p. 201.

[†] The reasons for thinking that the northward prolongation of the Sunda Range has not crossed the Arracan-Andaman ridge are, therefore :—

1. That the volcanoes on the west side of that ridge, which are supposed to continue the Sunda line, are of a different type from the volcanoes of the Sunda Range.

2. That these western volcanoes in Ramri belong to a system of vents of the same type as themselves, characterised by a linear distribution parallel to the western base of the Arracan-Andaman tertiary ridge.

3. That the Sunda Range is continued northward by a series of vents of the same type throughout, the character of linear distribution parallel to the eastern base of the Arracan-Andaman tertiary ridge being maintained unaltered.

[‡] Oldham : Records of the Geol. Survey of India, xviii., 141.

The question whether the line in which Narcondam, Barren Island, and Flat Rock are situated consists of a series of isolated peaks, or if these peaks are only the sub-aërial portions of a continuous ridge, remains to be considered. Such evidence as there is appears to indicate that they are situated on a ridge: it is not, however, at all complete. It has already been remarked that the soundings on a line passing north-north-east from Narcondam are relatively shallower than those on any other line. This has been explained by Carpenter as perhaps indicating that the deltaic shelf of the Irrawady extends as far out as Narcondam.* It may be anticipated that this will not be found a sufficient explanation of the phenomenon. It will be observed that the soundings gradually deepen for a space of 9½ miles, till the bottom carries 362 fathoms, and that beyond this point it gradually shallows till the coast of Pegu is reached. If Narcondam were situated on the edge of a delta-shelf, one would expect that the soundings would not show so great a dip within its margin, and would further expect that soundings on lines carried at right angles to the line under discussion would give some indication of a more or less level area. Yet what we do find is that before four miles to the east or three miles to the west of the island have been reached, greater depths have been obtained than the deepest sounding on the north-north-east line. This appears to indicate that Narcondam is not so much on the edge of a shelf, as at the end of a ridge that runs towards and into the Pegu coast-line. That this ridge is overlaid by the deltaic mud to within ten miles of Narcondam, and that the presence of this mud explains the gentle slope from its deepest point upwards to the Pegu coast is no doubt true; but the steady rise during the last ten miles towards Narcondam, coupled with the more abrupt dips to the east and to the west, indicate the existence of a ridge. The matter is capable of direct demonstration: a few lines of deep-sea soundings co-ordinate to the line of soundings taken towards the north-north-east, will disclose the true state of matters. It would also be equally easy, by making a line of borings along the continuation of its line, and a few co-ordinate lines across in the mud of the Irrawady delta, to demonstrate whether the supposed ridge passes subterraneously into Burma.

The same comparative shallowness is indicated by the line of soundings to the south-south-west of Barren Island, and to explain the fact Mallet† suggests the possibility of eruptions of ash distributed in this particular direction by the action of currents. It would seem easier, however, to explain these soundings by supposing that Barren Island formed the northern termination of a ridge on which Flat Rock, with Invisible Bank, is situated. Here, too, the matter is easily capable of demonstration: soundings on a line bearing from Barren Island to Flat Rock, with one or two transverse lines of soundings will show whether such a ridge exists.

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* Carpenter: Records of the Geol. Survey of India, xxi., 48.

† Mallet: Records of the Geol. Survey of India, xxi., 47.

The hypothesis that in Narcondam we see a continuation of the Sunda line of volcanic activity is not invalidated by the depth of the soundings between it and Barren Island. We know that there is a much deeper gap than this between two members of the same chain: in the well-known rift between Bali and Lombok, though the islands mentioned are only 15 miles apart, the narrow strait between is 2,100 fathoms deep.* And as a matter of fact, though the ridge is here deeper, it is by no means absent, for a sounding on the line bearing from Narcondam on Barren Island gives only 1,010 fathoms, while soundings to the west of that line, and between the supposed ridge and the Andamans, give 1,140, 1,159, and 1,130 fathoms. Though our knowledge of the bottom contour of the southern part of the Andaman Sea—the portion to the east of the Nicobars—is very defective, the little that we know bears out the hypothesis of an eastern as well as a western ridge. At a point 50 miles east of Little Nicobar a sounding of 1,284 fathoms is recorded, while 30 miles further east the bottom is only 1,000 fathoms deep. Then north of Pulo Rondo, in Lon. 95° 10′ E., the depth is 990 fathoms, while 20 miles further east it is only 930 fathoms. These soundings of 930 and 1,000 fathoms not improbably indicate the ridge on which Flat Rock, Barren Island, and Narcondam are situated. The 990 and 1,284 fathom soundings must indicate the trough between the ridges; for to the west of the latter lies the Nicobar Group, and to the west of the former, in Lon. 94° 20′ E., we find a depth of 975 fathoms, doubtless indicative of the western or Indian Ocean slope of the Nicobar-Sumatra ridge, since 25 miles further north, in Lon. 94° 26′ E., we have a sounding of 760 fathoms indicating the crest of that ridge. The soundings referred to are shown on the two maps that accompany this paper.

There is, perhaps, some connection between the depth of the rift separating Narcondam from Barren Island, and the fact that from Barren Island itself southwards the volcanoes either still are, or have till recently, been active, while those from Narcondam northwards have long been extinct. This has a certain bearing on another controverted point. Von Buch, as has been already stated, recognised the Sunda volcanic line as extending to, but not beyond, Barren Island. To Blanford is due the merit of having upset the fanciful hypothesis of the further extension of the line across the Arracan Yomah, and of having suggested its probably true northern continuation. More recently it has been proposed* by Berghaus and others to sub-divide the extended Sunda line of Blanford into a Sunda Range proper, ending at the northern limit of Sumatra, and a Pegu Range, containing Barren Island, Narcondam, Popah and Han-shuen-shan. But it is obvious that if any sub-division be necessary, the one proposed by Berghaus is erroneous. A sudden deep gap in the line, with the further character of activity to the south of it, and non-activity to the north, is a much more natural cleavage than merely a number of miles of intervening sea, the nature of whose bottom is unknown or has been misunderstood. If therefore Berghaus be justified in differentiating a Pegu Range, it is clear that Barren Island must be excluded from it, and that we must return to Von Buch's view, that Barren Island is the most northerly member of the Sunda Range. The Pegu Range of very old and long extinct volcanoes begins then at Narcondam, and extends at least as far as south-western Yunnan.

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* Wallace, Island Life, 423 (map).

The biological interest of these islands is not so great as the physiographical, because, whether the ridge here postulated exists or not, there is little doubt that these sub-aërial portions never have been connected with any of the adjacent lands. If Flat Rock has ever been sub-aërial, and in a fit condition to shelter air-breathing creatures and support vegetation, it is so no longer; how great soever may be the antiquity of the outer cone of Barren Island, it is probable from its configuration, that at one time it has been the scene of a catastrophe like that which in 1883 devastated Krakatau and totally destroyed its animal and vegetable life. The only one-that, from its topography, has evidently remained for many ages in its present condition is Narcondam. Already the writer has laid before this society some notes on the Fauna of the islands †; it remains now to be seen whether the biological facts indicated by their Flora are in agreement with the deductions that should follow from their physiographical configuration.

All the plants found in the two islands are enumerated in the list that follows; running numbers are added to the locality so as to show at a glance how many species occur in each. In the discussion that succeeds the list the peculiarities of each island are dealt with before their common characteristics are considered.

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* Stieler: Hand Atlas, sheet 8.

† Prain: Proceedings Asiat. Soc., Bengal, 1892, p. 109.

PLANTS COLLECTED IN NARCONDAM AND BARREN ISLAND.

I. MENISPERMACEÆ. I.

1. ANAMIRTA COCCULUS W. & A. Narcondam (1).
India, Indo-China, Malaya.

2. CYCLEA PELTATA H. F. & T. Barren Island (1).
Andamans, Nicobars, Burma,

3. ANTITAXIS CALOCARPA Kurz. Narcondam (2), common.
Andamans and Nicobars.

II. CAPPARIDEÆ. II.

4. CAPPARIS SEPIARIA Linn., *var.* GRANDIFOLIA Kurz. Narcondam (3); Barren Island (2); common.
Andamans, Burma, Malaya; the variety does not occur in India.

5. CAPPARIS TENERA Dalz., *var.* LATIFOLIA H. f. & T. Narcondam (4).
Andamans, Tenasserim; the variety does not occur in India.

III. VIOLARIEÆ. —.

6. ALSODEIA BENGALENSIS Wall. Narcondam (5).
Assam, Burma, Andamans, Nicobars.

IV. GUTTIFERÆ. —.

7. CALOPHYLLUM INOPHYLLUM Linn. Narcondam (6); beach-forest.
Mascarene Isds.; S. E. Asia; Australia; Polynesia.

V. MALVACEÆ. III.

8. HIBISCUS TILIACEUS Linn. Narcondam (7); Barren Island (3).
Cosmopolitan on tropical sea-shores.

9. THESPESIA POPULNEA Corr. Narcondam (8).
On tropical coasts throughout the Eastern Hemisphere.

10. BOMBAX INSIGNE Wall., *var.* POLYSTEMON Prain; *var. nov.* caudice armata, foliolis 7–9, sessilibus anguste lanceolatis, subtus glaucescentibus, staminibus plurimis (circa 700); capsula 3·5–4 poll. longa: floribus rubris. Narcondam (9); common.
India, Indo-China, Andamans, Malaya; this variety endemic.

There has been some confusion as regards the Asiatic species of *Bombax*; the writer, therefore, takes this opportunity of giving diagnoses of all of them. His excuse for doing so in this place, is that it was the difficulty of localising this tree that led to the study of the genus.

BOMBACES ASIATICÆ.

Arbores (ordinis MALVACEARUM) grandes, saltem juniores caudice armatæ foliis digitatis; calyce coriaceo; stylo simplici; fructu capsulari, segmentis 5; seminibus lana endorcarpii involutis.

Fructus segmentis crassissime coriaceis, seminibus sarcinis

lanæ propriis distincte involutis; cortice diu viridi: tubo staminali 1-seriali, segmentis 5, 1–3-antheris, petalis alternis; floribus minoribus sordide luteo-albis... *Bombax pentandrum* (*Eriodendron anfractuosum*).

[In India peninsulari et in insulis Andamanensibus, indigena et sylvestris; in India boreali, in Indo-China et præsertim in Malaya late culta et forsan inquilina.]

Fructus segmentis ligneis, lana endocarpii vix in sarcinis distinctis segregata; cortice mox cinerascente; floribus maximis, sæpissime rubris:—

Tubo staminali 5-seriali, serie interiori segmentis 5, 2-antheris, petalis alternis, cum serie altera staminibus simplicibus, 1-antheris, 10 per paria petalis oppositis fascem centralem stylum amplectentem formante; ceteris in phalangibus 2-cruralibus 5, petalis oppositis dispositis, staminibus phalangium singularum sub-12, omnibus binis 1-antheris; foliolis longius petiolulatis, laminis acuminato-caudatis subtus viridibus; stylo longibrachiato; capsula velutina .... *Bombax malabaricum.*

[In India peninsulari et boreali, in China australi et Indo-China, in archipelagine Malayana, insulis Philippinensibus et Australia boreali-orientali frequens.]

Tubo staminali multiseriali, staminibus omnibus binis 1-antheris, serie interiori (forsan cum serie *altera* tantum speciei præcedentis comparanda) staminibus 20 petalis oppositis annulum stylum amplectentem formante; ceteris in phalangibus 2-cruralibus 5, petalis oppositis dispositis, staminibus phalangium singularum numerosis; foliolis breve petiolutatis vel sessilibus, laminis acutis; stylo brevibrachiato; capsula glabra .... *Bombax insigne.*

[In India peninsulari occidentali; in Indo-China et in Malaya.]

Bombax pentandrum and *B. malabaricum* are wonderfully uniform in the number and arrangement of the elements of their staminal whorl; *B. insigne*, while equally uniform as regards the arrangement, varies considerably as regards the number of stamens in its phalanges. The subjoined key shows the distinguishing features and relative position of the most important of these varieties.

Tubo staminali ovario plus duplo longiore foliolis subsessilibus late lanceolatis, subtus viridibus glabris; floribus albis; (capsula ignota) .... *Bombax insigne*, SUB.-SP. *anceps* (*B. anceps* Pierre). *B. malabarici* var. *albiflora* Wall. [Cat. n. 1840/3 et 1840/4] vel ad hanc sub-speciem, vel ad *B. insignis* genuini var. *albam* referenda est.

[Burma (Shan); Cochin-China.]

Tubo staminali ovario vix longiore .... *Bombax insigne*, SUB.-SP *genuina*.

Staminibus phalangium cruralibus utrinque circa 20:—

Staminibus phalangium singularum inter-cruralibus circa 30, capsula (unius ignota), 10–12-pollicari:—

Foliolis subsessilibus late lanceolatis vel obovato-mucronatis, subtus glaucescentibus; floribus rubris .... var. *typica* (*B. insigne* Wall.; *B. festivum* Wall. [Cat. 1841]).

[Chittagong; Arracan; Pegu.]

Foliolis subsessilibus late lanceolatis, subtus viridibus glabris; floribus albis .... var. *alba* (*Salmalia malabarica* Hort. Bogor., *nequaquam* Schott).

[Java, culta; forsan Burma (*vide supra B. anceps*).]

Foliolis breve petiolulatis anguste lanceolatis, subtus glaucescentibus; floribus rubris .... var. *andamanica*.

[Andamans; ins. Cocos].

Foliolis breve petiolulatis anguste lanceolatis, subtus puberulis; (florum colore ab autore neglecto; capsula ignota) .... var. *cambodiensis* (*B. cambodiense* Pierre.

[Cambodia.]

Staminibus phalangium singularum intercruralibus circa 50, capsula 10–12-pollicari, foliolis subsessilibus late lanceolatis, floribus rubris .... var. *Wightii*.

[India; in prov. Kanara, Anamallai, Malabar.]

Staminibus phalangium singularum intercruralibus circa 90; capsula 3–4-pollicari tantum; foliolis sessilibus anguste lanceolatis, subtus glaucescentibus; floribus rubris .... var. *polystemon*.

[Narcondam.]

Staminibus phalangium cruralibus utrinque 10; phalangium singularum intercruralibus circa 30; capsula 10–12-pollicari; foliolis breve petiolulatis

lanceolatis subtus viridibus glabris,
floribus viridescentibus .... var. *larutensis*.
[Perak; prov. Larut: forsan etiam in archipelagine Malayana apud Priaman].

It will be noted that the writer is unable to perpetuate the generic rank (*Eriodendron*) assigned by DeCandolle to the Linnean *Bombax pentandrum*. When the differences in the staminal columns of the three 'species' here recognised are reduced to the simplest possible terms, we observe that in *B. pentandrum* this whorl consists of but one element, the items of which are alternate with the petals; that in *B. insigne*, likewise, there is but one element, the items of which are opposite the petals; that in *B. malabaricum*, on the other hand, both these elements occur. Either, therefore, *Bombax malabaricum* and *Bombax insigne* typify two genera as distinct from each other as *Eriodendron* is from either; or, as is here proposed, all three are congeneric. In another place the writer hopes to show that he is right in thinking, with Schumann, that *Pachira* does not deserve to be removed generically from *Bombax*; that he is justified in further reducing *Chorisia* to *Eriodendron*, and therefore also to *Bombax*; and is entitled to believe, with Willdenow, that the characters which separate *Adansonia* from *Bombax* are too trivial to be generic.

On the other hand, it will be noted that the material of some of the forms included in *B. insigne* is not yet complete, and it will be readily understood that writers who recognise as distinct the 'genera' referred to in the preceding paragraph, will be still more apt to treat as specifically separable the various forms of *B. insigne* here defined. No work on Indian Botany hitherto published notes *B. insigne* as Indian; the tree, when mentioned, is stated to occur only in Indo-China.

VI. STERCULIACEÆ. IV.

11. STERCULIA RUBIGNIOSA Vent., *var.* GLABRESCENS King. Narcondam (10); Barren Island (4).

Andamans and Nicobar coasts, general; the variety only.

—. *HERITIERA LITTORALIS* Dryand. Narcondam, fruits on beach, E. Bay; Barren Island, fruits on beach at Landing-place Cove: not found growing in either island.

VII. TILIACEÆ. —.

12. GREWIA LÆVIGATA Vahl. Narcondam (11); in leaf only.

Africa; India, Burma, Malaya; Australia.

VIII. RUTACEÆ. —.

13. GLYCOSMIS PENTAPHYLLA Corr. Narcondam (12).

India, Indo-China, Malaya.

IX. BURSERACEÆ. V.

14. GARUGA PINNATA Roxb. Narcondam (13); Barren Island (5); in both islands common.

India, Burma, Malaya.

—. *CANARIUM EUPHYLLUM* Kurz. Narcondam?

The leaves of this species occur in Herb. Calcutta, and are given as from

Narcondam, on the authority of the Andaman Deputation of 1866, by whom the specimen was collected; the writer did not see the tree in 1891. As the deputation visited the Coco Group (where the species does occur) as well as Narcondam, and as there are many other errors of locality on the tickets of their collection, the species, though here mentioned, is not formally included in the list.

X. MELIACEÆ. —.

15. AMOORA ROHITUKA W. & A. Narcondam (14).
India, Burma, Malaya.
16. AMOORA DECANDRA Hiern. Narcondam (15).
Central and Eastern Himalaya; Malaya.
—. *CARAPA MOLUCCENSIS* Lamk. Narcondam; seeds on beach, E. Bay.

XI. OLACINEÆ. —.

17. CANSJERA RHEEDEI Gmel. Narcondam (16).
India, Burma, Malaya; N. Australia; S. China.
18. APODYTES ANDAMANICA Kurz. Narcondam (17).
Andamans.

XII. RHAMNEÆ. VI.

19. COLUBRINA ASIATICA Brogn. Narcondam (18); Barren Island (6).
Africa; India and Ceylon; Burma, Malaya; N. Australia.
20. GOUANIA LEPTOSTACHYA Brogn. Narcondam (19), very plentiful.
India, Burma, Malaya.

XIII. AMPELIDEÆ. VII.

21. VITIS REPENS W. & A. Barren Island (7), very common.
India, Burma, Malaya.
22. VITIS CARNOSA Wall. Narcondam (20), common.
India, Burma, Malaya.
23. VITIS LANCEOLARIA Roxb. Narcondam (21).
India, Indo-China, Malaya.
24. LEEA SAMBUCINA Willd. Narcondam (22); Barren Island (8).
India, Burma, Malaya.

XIV. SAPINDACEÆ. VIII.

25. ERIOGLOSSUM EDULE Bl. Narcondam (23), common; Barren Island (9).
India, Burma, Malaya; N. Australia.
26. ALLOPHYLUS COBBE Bl. Narcondam (24), at Coco Bay.
India, Burma, Malaya.
27. DODONÆA VISCOSA Linn. Barren Island (10), common in the valley south of the lava.
Cosmopolitan in the tropics.

XV. ANACARDIACEÆ. IX.

28. **Odina Wodier** Roxb. Narcondam (25), very common.
India, Indo-China.

29. **Semecarpus heterophylla** Bl. Narcondam (26); Barren Island (11).
Indo-China, Andamans, Malaya.

XVI. LEGUMINOSÆ. X.

30. **Desmodium polycarpon** DC. Narcondam (27); Barren Island (12).
East Africa; S.-E. Asia; Polynesia; Japan and China.

31. **Abrus precatorius** Linn. Narcondam (28); Barren Island (13).
Cosmopolitan in the tropics.

32. **Erythrina indica** Lamk. Narcondam (29), coast, Anchorage Bay.
India, Burma, Malaya.

33. **Mucuna gigantea** DC. Narcondam (30), common.
India, Indo-China, Malaya; Polynesia.

34. **Canavalia turgida** Grah. Narcondam (31), Coco and East Bays.
India, Indo-China, Malaya.

35. **Vigna lutea** A. Gray. Narcondam (32), on coast.
Cosmopolitan in the tropics.

36. **Phaseolus adenanthus** G. F. Mey. Narcondam (33), abundant on beach at East Bay.
Cosmopolitan in the tropics.

37. **Dalbergia tamarindifolia** Roxb. Barren Island (14).
India, Indo-China, Malaya.

38. **Dalbergia monosperma** Dalz. Narcondam (34), coast north of Anchorage Bay.
India, Indo-China, Malaya; Australia; China.

39. **Derris scandens** Benth. Narcondam (35), East Bay, in sea-fence.
India, Indo-China, Malaya; Australia; China.

40. **Pongamia glabra** Vent. Barren Island (15), one tree behind the beach at the landing-place, and close to the lava.
Mascarene Isds; India, Indo-China, Malaya; Australia; Polynesia.

41. **Cæsalpinia Bonducella** Flem. Narcondam (36), Coco Bay.
Cosmopolitan in the tropics.

42. **Entada scandens** Benth. Narcondam (37).
Cosmopolitan in the tropics.

43. **Acacia concinna** DC. Narcondam (38); Barren Island (16); common.
India, Indo-China; China.

XVII. COMBRETACEÆ XI.

44. **Terminalia Catappa** Linn. Narcondam (39); Barren Island (17).
Andamans, Malaya.

This is comparatively scarce in Narcondam, but on Barren Island it is undoubtedly the most numerously represented tree present. Though really a littoral species, it is not here confined to the shore, but extends from base to summit of the outer cone on both sides wherever there is soil suitable for it to grow. Its general dispersal in the island has been largely assisted by the rats; they carry off the fruits in order to eat the fleshy outer portion.

45. GYROCARPUS JACQUINII Roxb. Narcondam (40).
Africa; India, Indo-China, Malaya; Polynesia: not in the Mascarene Islands or E. Africa.

XVIII. MYRTACEÆ. XII.

46. EUGENIA JAMBOLANA Linn. Barren Island (18), very common.
India, Indo-China, Malaya; Australia.
47. BARRINGTONIA SPECIOSA Forst. Narcondam (41).
Ceylon; Andamans, Malaya; Australia; Polynesia.

The fruits of this species were picked up on the beaches in Barren Island, but the tree itself was not found growing.

XIX. MELASTOMACEÆ. —.

48. MEMECYLON EDULE Roxb. Narcondam (42).
Ceylon; Indo-China, Andamans, Malaya; Philippines.

XX. CUCURBITACEÆ. —.

49. TRICHOSANTHES PALMATA Roxb. Narcondam (43).
India, Indo-China, Malaya; Australia; Japan and China.

XXI. RUBIACEÆ. XIII.

50. OLDENLANDIA CORYMBOSA Linn. Barren Island (19), in the crater.
America; Africa; India, Indo-China, Malaya.
51. MUSSÆNDA MACROPHYLLA Linn. Barren Island (20), common.
Indo-China, Andamans.

This plant, which is common in the valley between the cones, close to the lava, is one of the species reported by the Deputation of 1866; flowering specimens collected then are preserved in the Calcutta Herbarium, but are noted as being from Narcondam, not Barren Island. The species does not appear to occur in Narcondam, for the plant was carefully looked for there. The mistake on these tickets, which requires to be pointed out, since some of the specimens collected in 1866 may have reached Herbaria in Europe, is nevertheless a fortunate one, as it first called the attention of the writer to the fact that, though this Deputation only reported on Barren Island (*Proc. As. Soc., Beng.*, 1866, 215), it visited Narcondam also. The interest of this fact will be shown in discussing the presence of the Coco-nut.

The species has here, owing to its situation, developed a shrubby habit, but careful examination of the complete material obtained by the writer, leads him to conclude that it cannot be looked upon as even varietally distinct.

52. GUETTARDA SPECIOSA Linn. Narcondam (44).
Cosmopolitan in the tropics.

53. IXORA BRUNNESCENS Kurz. Narcondam (45), and Barren Island (21); common on the coasts.
Andamans.

54. IXORA CUNEIFOLIA Roxb. Barren Island (22), within outer cone.
Indo-China.

55. MORINDA CITRIFOLIA Linn., *var.* BRACTEATA H. f. (SP. Roxb.) Narcondam (46), very common everywhere, from sea-level to the top of the hill, at 2300 feet elev.; Barren Island (23), common.
India, Indo-China, Andamans.

56. PÆDERIA FŒTIDA Linn. Narcondam (47).
India, Burma, Malaya.

XXII. COMPOSITÆ. XIV.

57. VERNONIA DIVERGENS Benth. Narcondam (48), on coast.
India, Indo-China.

58. BLUMEA GLOMERATA DC. Narcondam (49), rocks, west coast.
India, Indo-China, Malaya; China.

59. BLUMEA LACINIATA DC. Narcondam (50), rocks east coast.
India, Indo-China, Malaya; China.

60. BLUMEA MYRIOCEPHALA DC. Narcondam (51), at 1500–1800 feet.
Eastern Himalaya, Indo-China, Andamans.

61. PLUCHEA INDICA Less. Narcondam (52), and Barren Island (24), on coasts; common.
India, Indo-China, Malaya; China.

62. WEDELIA SCANDENS C. B. Clarke. Narcondam (53), common on coasts; Barren Island (25), coasts.
India, Indo-China, Malaya.

XXIII. GOODENOVIEÆ. XV.

63. SCÆVOLA KŒNIGII Vahl. Narcondam (54); Barren Island (26).
India, Indo-China, Malaya; Australia; Polynesia.

XXIV. MYRSINEÆ. XVI.

64. ARDISIA HUMILIS Vahl. Narcondam (55); Barren Island (27).
India, Indo-China, Malaya; China.

XXV. SAPOTACEÆ. —.

65. SIDEROXYLON FERRUGINEUM H. & A. Narcondam (56).
Malaya, Andamans; China.

This is another of the species obtained by the Deputation of 1866: on this occasion the labels are correct. The form present here has unusually large leaves—in young trees they are 30 in. long by 12 in. across.

66. Diospyros Kurzii Hiern. Narcondam (57).
Andamans and Nicobars.

xxvi. APOCYNEÆ. xvii.

67. Aganosma marginata G. Don. Barren Island (28), very common in the valley between the cones, to the south of the lava.
Indo-China, Malaya.

68. Anodendron paniculatum A. DC. Narcondam (58).
India, Indo-China, Malaya.

xxvii. ASCLEPIADACEÆ. xviii.

69. Tylophora globifera H. f.? Narcondam (59); in fruit only.
Andamans.

70. Hoya parasitica Wall. Narcondam (60); Barren Island (29).
Indo-China, Malaya.

71. Hoya diversifolia Bl. (*H. orbiculata* Wall.) Narcondam (61); Barren Island (30).
Indo-China, Malaya.

72. Dischidia nummularia R. Br. Narcondam (62).
Indo-China, Malaya; Australia.

xxviii. EBENACEÆ. xix.

73. Mitreola oldenlandioides Wall. Barren Island (31), abundant underneath a thicket of gregarious *Flueggia* to the north of the lava at Landing-place Cove; not seen elsewhere.
India, Burma, Malaya; N. Australia.

74. Strychnos acuminata Wall. Narcondam (63), once at 1600 feet.
Burma, Andamans.

xxix. CONVOLVULACEÆ. xx.

75. Ipomœa grandiflora Lamk. Narcondam (64); Barren Island (32).
East Africa; India, Indo-China; Malaya, Australia, Polynesia.

76. Ipomœa denticulata Choisy. Narcondam (65), at East Bay.
Mascarene Islands; Laccadives and Ceylon; Andamans, Indo-China, Malaya; Australia, Polynesia.

77. Ipomœa turpethum R. Br. Narcondam (66), in the bed and round the edges of a small dry lagoon in the beach-forest at East Bay.
Mascarene Islands; India, Indo-China, Malaya; Australia, Polynesia.

78. Ipomœa biloba Forsk. Narcondam (67); Barren Island (33).
Cosmopolitan in the tropics.

79. Ipomœa vitifolia Sw. Narcondam (68), Coco Bay, abundant.
India, Burma, Malaya.

80. Convolvulus parviflorus Linn. Narcondam (69), Anchorage Bay.
Africa; Indo-China, Malaya; Australia.

—. SOLANACEÆ. XXI.

81. PHYSALIS MINIMA Linn. Barren Island (34), on a small landslip on outer cone, south of Landing-place Bay.
Cosmopolitan in the tropics.

—. SCROPHULARINEÆ. XXII.

82. VANDELLIA CRUSTACEA Benth. Barren Island (35), on the small landslip, and also inside the crater.
Africa; India, Indo-China, Malaya; Australia, Polynesia; China.

XXX. BIGNONIACEÆ. XXIII.

83. OROXYLUM INDICUM Vent. Narcondam (70); Barren Island (36).
India, Indo-China, Malaya.

XXXI. ACANTHACEÆ. XXIV.

84. ERANTHEMUM SUCCIFOLIUM Kurz. Narcondam (71); Barren Island (37).
Andamans, Nicobars.

XXXII. VERBENACEÆ. XXV.

85. CALLICARPA ARBOREA Roxb. Narcondam (72); Barren Island (38).
India, Burma, Malaya.

86. PREMNA INTEGRIFOLIA Linn. Narcondam (73); Barren Island (39).
India, Indo-China, Andamans.

87. CLERODENDRON INERME Gærtn. Narcondam (74), at East Bay.
India, Indo-China, Andamans.

XXXIII. NYCTAGINEÆ. XXVI.

88. BOERHAAVIA REPENS Linn. Narcondam (75); Barren Island (40); common on rocks on the coast.
Cosmopolitan in the tropics.

89. PISONIA ACULEATA Linn. Narcondam (76), not very plentiful.
Cosmopolitan in the tropics.

90. PISONIA ALBA Span. Narcondam (77), beach-forest, E. Bay.
Laccadives, Ceylon; Andamans, Malaya.

91. PISONIA EXCELSA Bl. Narcondam (78), abundant, E. Bay.
Andamans, Malaya.

XXXIV. ARISTOLOCHIACEÆ. —.

92. ARISTOLOCHIA TAGALA Cham. & Schlecht. Narcondam (79).
India, Indo-China, Malaya; China.

XXXV. MYRISTICACEÆ. —.

93. MYRISTICA GLAUCA Bl. Narcondam (80).
Indo-China, Andamans, Malaya.

XXXVI. EUPHORBIACEÆ. XXVII.

94. BRIDELIA TOMENTOSA Bl. Narcondam (81).
India, Indo-China, Malaya, Australia, China.

95. ACTEPHILA EXCELSA Muell.-Arg. (*A. javensis* Miq.) Narcondam (82); gregarious and plentiful, the commonest species in the island.
India, Burma, Malaya.

96. PHYLLANTHUS RETICULATUS Poir. Barren Island (41), to the south of the lava, near inner base of outer cone.
Africa; India, Burma, Malaya; China.

97. GLOCHICHON CALOCARPUM Kurz. Narcondam (83), and Barren Island (42); common on rocks on the coast.
Andamans and Nicobars.

98. FLUEGGIA MICROCARPA Bl. Barren Island (43); gregarious and plentiful between the cones to the north of the lava.
Africa; India, Indo-China, Malaya; Australia; China.

99. BREYNEA RHAMNOIDES Muell.-Arg. Narcondam (84).
India, Burma, Malaya; China.

100. CYCLOSTEMON MACROPHYLLUS Bl. Narcondam (85).
India, Andamans, Malaya.

101. CYCLOSTEMON ASSAMICUS Hook. f. Narcondam (86).
Eastern Himalaya, Assam; Andamans.

102. BLACHIA ANDAMANICA Hook. f. Narcondam (87), Anchorage Bay.
Andamans.

103. MALLOTUS ANDAMANICUS Hook. f. Narcondam (88), gregarious and common, but less so than *Actephila excelsa*.
Andamans.

104. MACARANGA TANARIUS Muell.-Arg. Narcondam (89); Barren Island (44).
Andamans, Malaya.

105. GELONIUM BIFARIUM Roxb. Narcondam (90), plentiful on the coast; Barren Island (45).
Andamans, Malaya.

XXXVII. URTICACEÆ. XXVIII.

106. TREMA AMBOINENSIS Bl. Narcondam (91), common on rocky coasts and inland also; Barren Island (46), general, some stunted examples occur even on the bare inner cone.
Eastern Himalaya, Indo-China, Andamans, Malaya.

107. FICUS GIBBOSA Bl., *var.* CUSPIDIFERA King. Barren Island (47).
India, Indo-China, Malaya.

108. FICUS GLABERRIMA Bl. Narcondam (92); one of the tallest trees.
Himalaya, Indo-China, Malaya.

109. Ficus Benjamina Linn. Narcondam (93); seeds brought have germinated at Calcutta.
India, Indo-China, Malaya.

110. Ficus retusa Linn., *var.* nitida King (*sp.* Thunbg). Narcondam (94), and Barren Island (48); very common on both islands.
India, Indo-China, Malaya; Australia; New Caledonia; China.

111. Ficus nervosa Roth. Narcondam (95), at 1,800 feet elevation.
India, Indo-China, Malaya; China.

112. Ficus Rumphii Bl. Narcondam (96), and Barren Island (49); very plentiful.
India, Indo-China, Malaya.

113. Ficus callosa Willd. Narcondam (97), beach-forest at East Bay; a very tall tree.
India, Indo-China, Malaya.

114. Ficus brevicuspis Miq. Narcondam (98), very common; Barren Island (50); this is one of those species in which many of the branchlets are hollow and afford homes for species of ants.
Andamans, Malaya.

115. Ficus hispida Linn., *var.* typica. Barren Island (51), in the valley between the cones, at the inner base of the outer cone.
India; Indo-China, Malaya.

var. dæmonum King (*sp.* Kœnig.). Narcondam (99), and Barren Island (51); frequent.
India, Indo-China, Malaya.

116. Ficus variegata Bl. Barren Island (52); on the hill at the west end of southern part of outer cone, overlooking Landing-place Bay.
Indo-China, Malaya.

117. Antiaris toxicaria Leschen. Narcondam (100), not common.
India, Burma, Malaya.

The leaves of the form present here exactly match those of Malayan specimens named *A. rufa* by Miquel.

118. Artocarpus Lakoocha Roxb. Narcondam (101).
India, Indo-China, Malaya.

119. Bœhmeria malabarica Wedd. Narcondam (102); very plentiful.
India, Indo-China, Malaya.

120. Pipturus velutinus Wedd. Narcondam (103), plentiful.
Nicobars, Malaya; Polynesia.

—. ORCHIDACEÆ. xxix.

121. Dendrobium sp. Barren Island (53), rather common on trees on inside of outer cone.

122. PHOLIDOTA IMBRICATA Lindl. Barren Island (54), inside crater.
India, Burma, Malaya.

XXXVIII. SCITAMINEÆ. —.

123. MUSA SAPIENTUM Linn. The *Plantain.* Narcondam (104), a large grove behind the Coco-nut trees at Coco Bay.
Cosmopolitan in the tropics, cultivated.

No doubt deliberately introduced for the benefit of possibly ship-wrecked mariners, though it is not quite clear who planted it; probably (see under *Cocos nucifera*) it has been introduced from the Andamans, and perhaps dates from 1866.

XXXIX. DIOSCOREACEÆ. XXX.

124. DIOSCOREA SATIVA Linn. Narcondam (105) Barren Island (55).
India, Burma, Malaya; Australia.

125. DIOSCOREA GLABRA Roxb. Barren Island (56); common.
India, Burma, Malaya.

XL. LILIACEÆ. XXXI.

126. DRACÆNA ANGUSTIFOLIA Roxb. Narcondam (106), Anchorage Bay.
Indo-China, Malaya, Australia.

127. GLORIOSA SUPERBA Linn. Barren Island (57), E. coast near sea.
Africa; India; Indo-China, Malaya.

XLI. COMMELINACEÆ. —.

128. POLLIA ACLISIA Hassk. Narcondam (107), very abundant on slopes overlooking south end of Anchorage Bay.
Eastern Himalaya, Indo-China, Malaya.

XLII. PALMEÆ. XXXII.

129. CARYOTA MITIS Lour. (*C. sobolifera* Wall.) Narcondam (108).
Indo-China, Malaya.

130. COCOS NUCIFERA Linn. Narcondam (109), many at Coco Bay, a few at Anchorage Bay, one, not yet bearing, at E. Bay; Barren Island (58), thirteen trees counted from the offing, behind the *Pandanus* fence at Anchorage Bay; none seen elsewhere.
India; Malaya; Polynesia; America.

The introduction of this tree into these islands is a question of some interest. The tree at E. Bay, Narcondam, has no doubt been produced from a nut washed round from Coco Bay; in all likelihood the trees at Anchorage Bay have been derived from the same source. The trees at Coco Bay itself may have originated from nuts brought from the Coco Group by a surface-current sweeping from the Sea of Bengal, through the Preparis Channels, from N.-E. to S.-W. across the Andaman Sea; but as they are associated, where they occur, with a grove of *Musa sapientum* (which must have been deliberately introduced), it is not unreasonable to suppose that the two species were introduced together.

The question is, when did they first appear? Hume and Ball landed in 1873 at the very spot where they are now so plentiful, yet no mention is made by either writer of their presence. As Ball speaks of some of the species observed at this Bay, and as Hume describes the Coco-nuts seen by him, shortly after, at the Cocos, it is hard to believe that the trees were there in 1873. Again, Mallet makes no reference to them in 1884; the maps accompanying his account indicate that he and Hobday landed at Anchorage Bay, and he may not therefore have seen the large grove at Coco Bay; but those at the beach where he landed should have been evident to him. Mallet's paper is however confined to the geology and topography of the island, and hardly alludes to its vegetation. But Hume, Ball, and Mallet are equally silent regarding the Coco-nuts on Barren Island which we know to have been present in 1866, for they were seen by the Andaman Deputation—whose report has been already referred to (p. 56)—behind a beach, to which they still seem confined. As these three writers failed to notice Coco-nuts in Barren Island, where we know they existed at the time of these visits, there is no reason why Coco-nuts should not have been present then in Narcondam also. The Andaman Deputation in their Report (*Proc. As. Soc., Beng.*, 1866, 215)., say: "We brought from Port Blair with "us a number of Cocoa-nuts, Plantain trees, and Pine-apple cuttings, and these "we planted on the ground from which the grass had been cut, in hopes that "they might be of use to some future visitors."* We have seen, in connection with some of the species in this list, that the same deputation visited Narcondam also, though it did not report on that island; nothing therefore is more probable than that the deputation did there what it had done on Barren Island, and that to its members belongs the credit of having introduced, at least, the Plantains. But the Coco-nut trees are so much more numerous, and so much larger on Narcondam than on Barren Island, that one finds it difficult to think they only date from 1866. It is unfortunate that the deputation did not find it necessary to report on Narcondam as well as on Barren Island; had they done so, there is little doubt the report would have mentioned any Coco-nuts that were present. However, even if the Coco-nut trees were already there in 1866, the writer is inclined to think that their origin must still be due to introduction by some previous visitor.

The Coco-nuts on Barren Island may be supposed to have originated from nuts swept up by a strong surface-current that flows from the south-west, and that therefore would bring drift from the Nicobars where Coco-nuts are plentiful. But it is more likely that the trees have been introduced, though involuntarily, by man. For though there is reason to believe that no one has ever landed at this particular beach, this bay affords the only safe anchorage in the island, and it is therefore more probable that these trees have sprung from nuts that have fallen overboard from

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* There was no trace of any of these in the locality indicated during the writer's visit, a circumstance not surprising; because, in the first place, the situation is not over-suitable for such species, and, besides, goats have been since then introduced into the island! It may be mentioned that no one at Port Blair in 1891 knew of the existence of Coco-nuts in Narcondam, and the writer consequently took a number with him in order to plant them, only to find the act unnecessary. And, bearing in mind the state of affairs in Great Coco (*Journ. As. Soc., Beng.*, lx, pt. 2, 315), he also took fruits of *Carica Papaya* for the same purpose. Should, therefore, subsequent visitors find this species established in the island, they are hereby relieved of the necessity of inventing an hypothesis to explain the circumstance.

some craft lying off this beach, than that they have been brought by the sea from the Nicobars, or that they have been deliberately introduced by man.

XLIII. PANDANACEÆ. XXXIII.

131. PANDANUS ODORATISSIMUS Linn. f. Narcondam (110), common at Coco Bay and elsewhere; Barren Island (59), at Anchorage Bay.

India, Indo-China, Malaya.

XLIV. AROIDEÆ. —.

132. AMORPHOPHALLUS (*Candarum*) REX Prain, *sp. nov. tubere* magno depresso-globoso; *cataphyllis* 4, oblongo-lanceolatis; *folii* petiolo parum asperato vix maculato, lamina trisecta segmentis irregulariter dichotomis iterumque pinnatisectis, pinnulis (imis nonnunquam exceptis) ad costulas decurrentibus, ovato-oblongis, caudato-acuminatis, nervis supra impressis, subtus prominentibus, sinubus angustis; *pedunculo* crasso florifero brevi, fructigero elongato; *spatha* juniore cataphyllis obtecta, matura tubo infundibulari crasso in laminam late campanulatam margine tandem reflexa undulato-plicatam postice acuminatam expanso; *spadice* spatha subduplo longiore, erecto, stricto, crasso; *inflorescentiis* tubo spathæ subinclusis, *fœminea* sursum parum angustata quam *masculam* parum obconicam dimidio longiore, *appendice* crassa conico-pyramidali inflorescentiis dimidio longiore et, saltem prope basin, quam eas triplo latiore. Narcondam (111), very common.

Tubere diam. 9–18-poll.; *cataphyllis* spiraliter dispositis, imo exteriore 3 poll., altero 9 poll., tertio 12 poll, summo interiore 19 poll. longis, omnibus 2 poll. latis, pallide viridibus maculis olivaceis, demum tamen subconcoloribus luteis; *petiolo* 2·5–6-pedali basi ipsa 4·5 poll. crasso, sursum spatio brevi ita incrassato ut loco supra solum 4 poll. alto crassitudinis 5-pollicaris, deinde paullatim se coartante et apud trifurcationem diam. 3·5 poll. tantum, pallide viridi, maculis olivaceis, demum subconcolore olivaceo; *lamina* diam. 5·5-ped., supra olivacea subtus prasina, segmentis singulis 36 poll. longis, pinnulis ultimis 8–10 poll. longis, his 3–3·25 poll. latis; pedunculo florifero brevi, 2·5 poll. tantum longo, fructigero ad 30 poll. elongato, 1·5–2 poll. crasso, juniore pallide viridi maturo purpurascente; spatha a latere 16 poll., a basi ad apicem versus 19 poll. longa, infra substantiæ carnosæ sursum tenuescente, extus concolore pallide viridi, intus ad basin verruculosam lutea, supra pallide viridi ibi tamen margine excepto cito flavescente; *spadice* tota 21·5 poll. longa, parte *fœminea* 4·5 poll. longa, basi 2·25 poll. apice 1·75 poll. crassa, (fructigera 7 poll. longa et 3·5 poll. crassa) ex ovariis globosis 0·2 poll. diam. viridibus, 2-(rarissime 3-)locularibus, sessilibus, subcontiguis, in stylos 0·3 poll. longos, luteos contractis, stigmatibus plicatim 2–3-lobis, loculis 1-ovulatis, ovulis semianatropis decurvis, funiculo elongato angulo interiore parum supra basin affixis, in ala placentali circa basin funiculo exoriente et loculum fere totum complente innixis eademque amplexis; parte *mascula* 3 poll. longa, basi 1·75 poll., apice 2·5 poll. crassa, e floribus 4–5-antheris spiraliter dispositis, antheris singulis subsessilibus connectivo sursum parum producto, ellipsoideis sursum angustatis apice rimis lunulatis 2-porosis; *appendice* 14 poll. longa, hac basi 6 poll. crassa,

post anthesin caduca, spongiosa, rugosa, valleculosa, lutea et brunneo-maculata: *bacca* 1–2-sperma, 0·75 poll. longa, hac 0·25–0·35 poll. lata, ovata, versus apicem angustata, carnosa, lutea; *seminibus* pendulis ovatis, triente basilari e funiculo incrassato spongiosis, ceterum embryone corneo semini subconformi cartilageneis.

This species resembles the Java form, or a variety, of *Amorphophallus campanulatus* (*A. campanulatus* Blume, Rumphia, i, 139. t. 32, 33, as opposed to *Arum campanulatum*, Roxb., Hort. Beng., 66) in the conic-pyramidal shape of the appendix, but differs in other respects, more particularly in the leaf. It agrees with *A. virosus* Brown (*Bot. Mag.*, 6978) in having the male and female inflorescence of about equal length, but in other respects is very distinct, for *A. virosus* has the dense flowered turbinate male inflorescence, and the short oblong appendix characterstic of Roxburgh's *Arum campanulatum* of which it is probably only a form. The following brief diagnosis[†] may assist in indicating how very distinct the present plant is from the forms hitherto known:—

Petiole hardly verrucose; male flowers disposed spirally on an inflorescence not wider than the female: yellow pyramidal appendix (twice as long as broad, and) one-half longer than the combined inflorescences: (male and female inflorescences of equal length; spathe green concolorous) .... *A. rex*

Petiole very verrucose; male flowers disposed spirally on an inflorescence much wider than the female: purplish-brown appendix not so long as the combined inflorescences:—

  Male and female inflorescences of equal length, spathe green suffused with purple, externally white spotted (oblong appendix not longer than broad) .... *A. virosus.*

  Male inflorescence much shorter than the female, spathe purple concolorous .... *A. campanulatus.*

    Oblong appendix, not longer than broad .... *Arum campanulatum* Roxb. (India).

    Pyramidal appendix twice as long as broad *Amorphophallus campanulatus* Bl. (Java).[‡]

[†] In connection with this, it may be mentioned that the *Amorphophallus* from the Coco Group, mentioned (*Journ. As. Soc., Beng.*, lx, 2, 333) as related to *A. bulbifer* and *A. tuberculiger*, has since flowered at Calcutta, and has proved, as was then anticipated, to be a very distinct species. As the authors of the other species, have indicated by the specific name the tubercle-bearing habit of the species, the writer proposes for this one the name 'AMORPHOPHALLUS ONCOPHYLLUS' *Prain*. The diagnosis between it and the two species for which it might be mistaken, is as follows:—

Stigma sessile, spathe unconstricted, appendix equal in length to the combined inflorescences:—

  Female inflorescence shorter than the male .... *A. tuberculiger.*

  Female inflorescence as long as the male .... *A. bulbifer.*

Style distinct, spathe constricted slightly opposite the male inflorescence, appendix twice as long as the combined inflorescences .... *A. oncophyllus.*

[‡] As this paper has been passing through the press, the writer has learned from Sir Joseph Hooker, that he identifies *A. rex* with Blume's Java *A. campanulatus.*

133. POTHOS SCANDENS Linn. Narcondam (112), on trees; common.
India, Indo-China, Malaya.

XLV. CYPERACEÆ. XXXIV.

134. CYPERUS PENNATUS Lamk. Narcondam (113); Barren Island (60).
Africa, India, Indo-China, Malaya.

135. FIMBRISTYLIS DIPHYLLA Vahl. Barren Island (61).
America; Africa; India, Indo-China, Malaya; Australia; China.

136. FIMBRISTYLIS FERRUGINEA Vahl. Narcondam (114), rocks on coast; Barren Island (62), tussocks outside inner cone, also inside crater.
India, Indo-China, Malaya.

XLVI. GRAMINEÆ. XXXV.

137. OPLISMENUS BURMANNI Roem. & Schult. Barren Island (63).
India, Indo-China, Malaya; China, Japan.

138. THYSANOLÆNA ACARIFERA Nees. Narcondam (115) coasts.
India, Indo-China; Malaya.

139. POGONATHERUM SACCHAROIDEUM Beauv. Barren Island (64); common.
India, Indo-China, Malaya; China.

This species is very abundant on the rocky slopes forming the inner side of the outer cone; it is one of the plants collected by the Deputation of 1866; it was also collected in 1846 by Kamphövener, botanist on the Danish Frigate "*Galatea*," whose visit is commemorated by the name '*Galatea*' having been marked on the large block on the crater. Kamphövener's specimens are in the Herbarium at Copenhagen.

140. ISCHÆMUM MUTICUM Retz. Barren Island (65); common.
India, Indo-China, Malaya; Australia; Western Polynesia.

Usually a coast species, this here extends inland and fills the valley between the cones, covering all the bottom of this except the lava streams.

—. LYCOPODINEÆ. XXXVI.

141. LYCOPODIUM CERNUUM Linn. Barren Island, (66), interior of crater.
Cosmopolitan in the tropics.

142. PSILOTUM TRIQUETRUM Sw. Barren Island (67), interior of crater.
Cosmopolitan in the tropics.

XLVII. FILICES. XXXVII.

143. DAVALLIA SOLIDA Sw. Narcondam (116), on trees in beach-forest.
Andamans, Malaya, Polynesia; Australia.

144. DAVALLIA SPELUNCÆ Bak. Narcondam (117), common.
Africa; India, Indo-China, Malaya; Australia; Polynesia.

145. ADIANTUM LUNULATUM Burm. Barren Island (68), common.
Cosmopolitan in the tropics.

146. TRICHOMANES PYXIDIFERUM Linn. Narcondam, (118), at 2330 feet.
Cosmopolitan in the tropics.

147. CHEILANTHES TENUIFOLIA Sw. Barren Island (69), dwarf specimens, plentiful within the crater.

India, Indo-China, Malaya; Australia; Polynesia; China.

148. ONYCHIUM AURATUM Kaulf. Barren Island (70), occasional.

Himalayas, Indo-China, Malaya; China.

149. PTERIS LONGIFOLIA Linn. Barren Island (71), a few plants.

Cosmopolitan in tropical and sub-tropical countries.

150. PTERIS BIAURITA Linn. Barren Island (72), occasional.

Cosmopolitan in the tropics.

151. ASPLENIUM NIDUS Linn. Narcondam (119), on trees, rather common.

Mascarene Islands; India, Indo-China, Malaya; Polynesia.

152. ASPLENIUM FALCATUM Lamk., *var.* UROPHYLLUM Bak. Narcondam (120), very common on stony hill-sides; Barren Island (73).

Africa; India, Indo-China, Malaya; Australia; Polynesia.

153. NEPHRODIUM TERMINANS J. Sm. Narcondam (121), common.

India, Indo-China, Malaya; Australia; Polynesia; China.

154. NEPHROLEPIS TUBEROSA Presl. Barren Island (74).

Cosmopolitan in the tropics.

155. POLYPODIUM IRIOIDES Lamk. Narcondam (122), at 1800 feet.

Africa, India, Indo-China, Malaya; Australia; Polynesia.

156. POLYPODIUM ADNASCENS Sw. Narcondam (123); Barren Island (75).

Africa, India, Indo-China, Malaya; Polynesia.

157. POLYPODIUM QUERCIFOLIUM Linn. Narcondam (124); Barren Island (76).

India, Indo-China, Malaya; Australia.

158. ACROSTICHUM APPENDICULATUM Willd., *var.* SETOSA Bak. Narcondam (125), common.

India, Indo-China, Malaya.

159. ACROSTICHUM COSTATUM Wall., *var.* DELTIGERA. Narcondam (126); exactly = Wallich's *Meniscium deltigerum*.

E. Himalayas; Indo-China, Malaya.

160. ACROSTICHUM AUREUM Linn. Narcondam (127); and Barren Island (77); common on rocks on the coast.

Cosmopolitan in the tropics in salt marshes.

161. ACROSTICHUM SCANDENS J. Sm. Barren Island (78), near sea.

India, Indo-China, Malaya; Australia; Polynesia.

XLVIII. MUSCI. XXXVIII.

162. NECKERA RUGULOSA Mitt.[*] Narcondam (128), at 2330 feet.

Ceylon.

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[*] Examined, and kindly named for the writer by Dr. Brotherus, Helsingfors.

163. BRYUM CORONATUM Schwægr. Narcondam (129); Barren Island (79). Cosmopolitan in the tropics.

XLIX. LICHENES. XXXIX.

164. COLLEMA NIGRESCENS Achar. Narcondam (130), rather common; Barren Island (80), plentiful.
Cosmopolitan.

L. FUNGI.* XL.

165. POLYPORUS AUSTRALIS Fries. Narcondam (131); Barren Island (81).
Cosmopolitan in the tropics.

166. POLYPORUS XANTHOPUS Fries. Narcondam (132).
Cosmopolitan in the tropics.

167. LENZITES PLATYPHYLLUS Cooke, *Grevillea* xiii. 1. Narcondam (132).
Malay Peninsula.

168. DEDAELEA GRIERCINA Fries. Narcondam (134); Barren Island (82).
Cosmopolitan.

169. PENIOPHORA PAPYRINA Mont. Narcondam (135); Barren Island (83).
Cosmopolitan in the tropics.

170. HIRNEOLA POLYTRICHA Mont. Narcondam (136); Barren Island (84).
Cosmopolitan in the tropics.

171. THELEPHORA INCRUSTANS Pers. Narcondam (137); Barren Island (85).
Cosmopolitan.

172. RHYTISMA, sp. Narcondam (138); Barren Island (86); on leaves of *Ficus brevicuspis.*
Andamans.

ALGÆ. XLI.

173. CALOTHRIX PULVINATA Ag. Barren Island (87); on stones in the hot spring on the beach at Landing-place Cove.
Cosmopolitan.

174. CALOTHRIX TASMANICA Kg. Barren Island (88); on rocks in bed of torrent on inside of outer cone to the south of the lava.
Indo-China, Malaya; Australia.

§§§ NATURE AND ORIGIN OF THE FLORA.

The list includes 174 species, of which 138 occur in Narcondam and 88 in Barren Island; 86, or $62\frac{1}{3}$ °/o, of the Narcondam plants are absent from Barren Island, while 36, or 41 °/o, of the Barren Island species do not occur in Narcondam; only 52 species—making $37\frac{3}{4}$ °/o of the Narcondam, 59°/₀ of the Barren Island flora—are common to the two islands. Of the genera, 111 occur in Narcondam and 75 in Barren Island, but only 48,—43¼°/₀ of the Narcondam ones, 64°/₀ of those in Barren Island—are found in both places. Eleven natural orders present in Narcondam are unrepresented in Barren Island; five present in Barren Island are not found in Narcondam.

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* Examined, and kindly named for the writer by Mr. G. Masseé.

As regards *Cryptogams*, the two floras seem very similar, each having the same total number; the natural orders, however, indicate greater diversity of character among Barren Island than among Narcondam *Cryptogams*. There are two *Lycopodineæ*, and two *Algæ*, not represented in Narcondam; on the other hand, in Narcondam, at the top of the hill are a *Trichomanes* and a *Neckera*, absent from Barren Island. Of the thirteen ferns on Narcondam and 12 on Barren Island, 5 only are common to the two places; the Narcondam ferns belong to 6 genera, the Barren Island ones represent 8 genera. In Narcondam, one of the features of the vegetation is the presence of large beds of ferns; in Barren Island, ferns are scarce.

All the *Cryptogams* are herbaceous, and may all have their presence credited to wind-agency; *Acrostichum aureum*, however, in both islands, and *Acrostichum scandens* in Barren Island, grow only near the sea; both are denizens of mud-flats in the Sunderbuns, the Andamans and throughout Malaya and possibly therefore are sea-introduced.

Of the 46 natural orders of *Phanerogams* in Narcondam, 23 are represented by one species, 12 by two species, 3 by three species, and 3 by four species each; the only orders represented by more than four species, are *Compositæ* and *Convolvulaceæ*, each 6 sp.; *Euphorbiaceæ*, 10 sp.; *Leguminosæ*, 12 sp. and *Utricaceæ*, 13 sp. In the 35 natural orders in Barren Island we find that 21 are represented by one species, 8 by two species, and 2 by three species; the only orders represented by more than three species are *Leguminosæ*, *Rubiaceæ* and *Euphorbiaceæ*, 5 sp. each, and *Urticaceæ*, 7 sp. *Urticaceæ* is thus in both islands the leading natural order; this hegemony is due to the facilities that fruits of the order offer for introduction by frugivorous birds.

Of the 115 Narcondam *Phanerogams*, 33 are trees, 31 are shrubs, 37 are climbing species—woody climbers 16, herbaceous climbers 21; only 5 climbers being armed—and 14 are herbs. Of the 65 Barren Island species, 15 are trees, 17 are shrubs, 16 are climbers—woody 6, herbaceous 10; only 3 armed—and 17 are herbs. There are roughly speaking twice as many trees, shrubs and climbers in Narcondam as in Barren Island; the number of herbaceous species in the latter island is, however, slightly in excess of the number in the former. Of the herbaceous *Phanerogams* seven species are common to both islands; all are plants that may have been introduced by the sea. Of inland herbaceous species which may have been introduced by fruit-eating or marsh birds, or by the wind, the islands do not have one in common.

In Narcondam there are four *Compositæ* most probably introduced by wind; a grass, *Thsyanolæna*, may conceivably have been introduced in the same way. The two remaining herbs are the *Amorphophallus* which, even if in this island it has developed into a distinct form, *must* have originally been introduced by some fruit-eating bird, and the *Pollia*, which most probably has been introduced by the same agency.

In Barren Island, the wind-introduced species are two orchids and one grass, *Pogonatherum; Ischæmum muticum* has probably been introduced by the sea. The others have been introduced by birds; *Physalis* and *Mitreola* probably by fruit-eating birds; *Oldenlandia*, *Vandellia* and *Oplismenus* by birds to whose feet or feathers seeds have clung. Except *Pogonatherum*, *Ischæmum* and *Mitreola*, the Barren Island herbs are scarce.

The paucity of armed climbers in both islands is striking. The proportion of climbers to erect species is considerably higher in Narcondam, where they form one-third of the whole Phanerogamic flora, than in Barren Island, where they form only one-fourth, and partly in consequence of this, the jungle in Barren Island is opener than in Narcondam. Of the thirty-seven climbers in Narcondam, twelve have undoubtedly been introduced by fruit-eating birds, while one has most probably been introduced by its fruits having stuck to the feathers of some bird; fourteen have been introduced by the sea; six by winds. Of the remaining four species, which are more doubtful, two may be safely assumed to be here sea-introduced species also; one may be put down to the agency of birds, and only one species, the *Dioscorea*, is quite doubtful; perhaps the sea is on the whole the most likely agency.

Similarly, of the sixteen climbers on Barren Island, five are clearly species introduced by fruit-eating birds; to these a sixth probably should be added. Four are species certainly sea-introduced; to these another should probably, and two more should perhaps be added; of wind-introduced species there are three.

Very few of these species are common to both islands, only nine, or about half the Barren Island and one-fourth of the Narcondam climbers being so; of these four are again sea-shore species, and the *Dioscorea* found in both islands may be a fifth of the sea-introduced class. Two, the *Hoyas*, are wind-introductions; one, *Capparis sepiaria*, is certainly; another, the *Abrus*, is probably, a bird-introduced species.

Of the thirty-one Narcondam shrubs, one (*Musa*) has been introduced by man; on the other hand not a single shrub owes its presence to the agency of wind. As many as seventeen are unequivocally bird-introduced species; and ten are unequivocally sea-introduced species; the remaining three, which are all capsular-fruited *Euphorbiaceæ* (*Actephila*, *Macaranga* and *Mallotus*), though not unequivocally sea-introduced, are in all probability species of this class.

Of the seventeen Barren Island shrubs, seven are undoubtedly bird-introduced species; nine are sea-introduced species; one species, *Dodonæa*, is, though somewhat equivocally, to be looked upon as wind-introduced.

There is much greater conformity between the floras as regards this class; thirteen of the Barren Island shrubs occur also in Narcondam, only four being peculiar; all but one of the sea-shore, and all but two of the bird-introduced shrubs in Barren Island occur in Narcondam also.

The trees in the two islands have last to be considered. Of the thirty-three in Narcondam twenty-one, or more than three-fifths, have been introduced by birds; two from their fruits having been attached to the feet or feathers, the others, by fruit-eating birds: ten may have been sea-introduced; for seven this mode of introduction is undoubted, as regards *Caryota* it is rather equivocal, and the Coco-nut may have been deliberately introduced; two species are wind-introduced.

Of the fifteen Barren Island trees, nine are bird-introduced species; five are sea-introduced; one has been introduced by wind.

Here again great conformity between the floras is observable; of the fifteen Barren Island trees, ten occur in Narcondam:—these include all the bird-introduced ones except four, and all but one of the sea-introduced species; one wind-introduced species is common to the two islands.

Among herbaceous species, where the equality of numbers promised most agreement, there is therefore greater diversity between the two floras than among the others.

Of the 75 species of *Phanerogams* peculiar to Narcondam, 22 have been introduced by the sea, 42 by birds, and 10 by winds; one species (*Musa*) has been introduced by man. Of the 25 species peculiar to Barren Island, on the other hand 5 have been introduced by the sea, 15 by birds, 5 by winds. Of the 40 Phanerogams common to the two islands; 24 are sea-introduced, 13 are bird-introduced, 3 wind-introduced. In the common element of the two floras, the sea-introduced species form the dominant class, being nearly double the bird-introduced species and six times as numerous as the wind-introduced ones. In the special elements, on the other hand, the bird-introduced species form in both instances the dominant class; in Narcondam they are nearly twice as numerous as the sea-introduced and four times as numerous as the wind-introduced species; in Barren Island, they are three times as numerous as either of these kinds.

Materials for a Flora of the Malayan Peninsula.—*By* GEORGE KING, M. B., LL. D., F.R.S., C.I.E., *Superintendent of the Royal Botanic Garden, Calcutta.*

[Read June 7th].

No. 5.

ORDER XVI. DIPTEROCARPEÆ.

Resinous trees, rarely climbing shrubs. *Leaves* alternate, simple, quite entire, rarely sinuate-crenate, penni-nerved, the main nerves bold; stipules usually small and inconspicuous, sometimes larger and persistent, or fugitive, leaving an annular scar, (absent in *Ancistrocladus*). *Flowers* in few- or many-flowered, axillary and terminal racemes or panicles. *Bracts* usually minute or 0, rarely larger and persistent. *Sepals* free, or cohering into a tube surrounding but free from, or more or less adnate to, the base of the ovary and fruit. *Petals* contorted, connate at the base, or free. *Stamens* ∞, 15, 10 or 5, hypogynous or sub-perigynous, free, connate, or adnate to the petals; filaments short, often dilated at the base; anthers 2-celled, the outer valves sometimes larger, connective often aristate or with an obtuse appendage. *Ovary* slightly immersed in the torus, usually 3- rarely 2- or 1-celled; style subulate or fleshy, entire or with 3 minute stigmatic lobes; ovules anatropous, 2 in each cell, pendulous or laterally affixed (solitary and erect in *Ancistrocladus*). *Fruit* usually nut-like, its pericarp leathery or woody, 1- rarely 2-seeded, surrounded by the variously accrescent calyx of which two or more sepals or lobes are usually developed into linear wings. *Seed* exalbuminous (albumen fleshy and ruminate in *Ancistrocladus*); cotyledons fleshy, equal or unequal, straight or more or less plaited and crumpled, sometimes lobed; radicle directed towards the hilum, usually included between the cotyledons.—DISTRIB. Confined (except a few Tropical African species) to Tropical Eastern Asia; genera about 18, species about 250.

Sect. I. EU-DIPTEROCARPEÆ. *Ovaries* 3-celled, each cell 2-ovuled: stigmas united, more or less 3-lobed: seeds usually exalbuminous the outer segments of the fruiting calyx usually enlarged: trees or erect shrubs, mostly stipulate.

Fruiting calyx with 2 or more of its segments or sepals produced into long membranous, reticulate, nerved wings much longer than the fruit; pericarp leathery, (woody in some sp. of *Shorea*).

Fruiting calyx with a distinct tube.

Calyx-tube quite free from the fruit ... ... 1 *Dipterocarpus.*

Calyx-tube adherent to the fruit 2 *Anisoptera.*

Sepals united at the base only, the short calyx-tube either quite free from the fruit or slightly adherent to it, the calyx-segments or sepals valvate or nearly so.

Stamens with a single, long apical, appendage from the connective 3 *Vatica.*

Stamens with 4 apical appendages from the anthers and 1 from the connective ... 4 *Pentacme.*

Sepals free, imbricate.

The three outer sepals always, and one or both of the inner two occasionally, winged in the fruit; anthers with a short apical appendage from the connective ... ... 5 *Shorea.*

The two outer sepals winged in the fruit, the three inner not longer than the fruit and closely embracing it; stamens with a terminal appendage from the connective longer than the anther ... ... 6 *Hopea.*

Sepals of fruiting-calyx all enlarged but not exceeding, or only slightly exceeding, the fruit; pericarp leathery or woody.

Fruiting calyx embracing the fruit but not adherent to it.

Sepals of fruiting calyx slightly thickened.

Sepals of fruiting-calyx oblong, nearly equal, usually shorter than the fruit, reflexed or erect ... 7 *Retinodendron.*

Sepals of fruiting-calyx rotund, unequal (the inner two smaller), reflexed ... 8 *Isoptera.*

Sepals of fruiting calyx much thickened and woody at the base.
  Calyx forming a cup at the base of the fruit, but not adhering to it: pericarp woody ... ... 9 *Balanocarpus.*
Calyx adherent to the fruit: pericarp thickly leathery ... ... 10 *Pachynocarpus.*

Sect. II. ANCISTROCLADEÆ. *Ovary* 1-celled with a single ovule; stigmas 3, distinct: *Seeds* with copious ruminate albumen. Exstipulate climbers. ... ... 11 *Ancistrocladus.*

1. DIPTEROCARPUS, Gærtn. f.

Lofty trees, stellately pubescent or more or less clothed with fascicled hairs. *Leaves* coriaceous, entire or sinuate-crenate; lateral nerves connected by marginal loops and transverse reticulations; stipules large, valvate, enclosing the terminal bud, finally caducous and leaving an annular scar. *Flowers* large, white or reddish. *Calyx-tube* free. *Petals* usually pubescent externally, especially on the outer margin. *Stamens* ∞; anthers linear, equivalved, acuminate. *Ovary* 3-celled; style filiform; ovules 2 in each cell. *Fruit* nut-like, 1-seeded, enclosed in the accrescent calyx-tube, free; accrescent calyx-lobes 2, erect. *Seed* adnate to the base of the pericarp; cotyledons large, thick, unequal; radicle inconspicuous.—DISTRIB. Tropical E. Asia; species about 60.

Ripe fruit sphæroidal or ellipsoidal, neither angled nor winged.
  Young branches, petioles, under surfaces of the midribs, and nerves of the leaves covered with coarse stiff fasciculate hairs.
    Fruit glabrous ... ... 1. *D. crinitus.*
    ,, stellate-pubescent ... ... 2. *D. Scortechinii.*
  Young branches deciduously pubescent.
    Leaves with 12 or more pairs of nerves.
      Leaves oblong-elliptic, their under surfaces sparsely stellate-pubescent ... 3. *D. Skinneri.*
      Leaves elliptic or ovate-elliptic, their under surfaces puberulous or quite glabrous ... ... 4 *D. turbinatus.*
    Leaves with 8 to 10 pairs of nerves.
      All parts quite glabrous ... ... 5. *D. Kerrii.*

Ripe fruit with 5 angular tuberosities on its upper portion ... ... 6. *D. cornutus.*
Ripe fruit 5-angled :
  Calyx-tube glabrous; leaves 2·5 to 3·25 in. long ... ... 7. *D. fagineus.*
  Calyx-tube densely stellate-tomentose; leaves 6 to 8 in. long ... ... 8. *D. oblongifolius.*
Ripe fruit with its 5 angles produced into wings :
  Leaves glabrous :
    Young branches at first scurfy-puberulous, ultimately quite glabrous : buds ovoid, minutely pale canescent ... 9. *D. grandiflorus.*
    Young branches as in the last, but with conspicuous tawny-tomentose, oblique annuli; buds cylindric, hoary-canescent ... ... 10. *D. Kunstleri.*
    Young branches minutely tawny-pubescent, not annulated and never glabrous; buds ovoid, densely sericeous 11. *D. Griffithii.*
  Leaves minutely stellate-pubescent on the lower surface :
    Flowers about 1 in. long; leaves with rounded or sub-cordate bases; young branches very stout, with ovoid buds : the accrescent lobes of the calyx 1·5 in. broad ... ... 12. *D. incanus.*
    Flowers 1·5 in. long; leaves with rounded or cuneate, not sub-cordate, bases : young branches moderately stout with cylindric buds : accrescent calyx-lobes ·7 to ·8 in. broad ... ... 13. *D. alatus.*

1. DIPTEROCARPUS CRINITUS, Dyer in Hook. fil. Fl. Br. Ind. I. 296. A tree 90 to 150 feet high : young branches, petioles, under surface of midrib and nerves, pedicels and outer surface of bracts of inflorescence clothed with stiff yellowish-brown fascicled hairs. *Leaves* very coriaceous, ovate or more usually obovate, acute, the base rounded or subacute; the edge entire, fringed with fascicled hairs, recurved (at least when dry); both surfaces sparsely hispid when young, glabrescent when old; main nerves 12 to 18 pairs, spreading, rather straight, very prominent on the lower, depressed on the upper, surface; length 3 to 5 in., breadth 1·75 to 2·75 in., petiole 1 to 1·25 in. *Racemes* about 6-flowered. *Flowers* nearly 2 in. long. *Calyx* glaucous, glabrous. *Petals*

puberulous, linear, blunt. *Stamens* 15. *Fruit* (immature) ellipsoid, wingless, glaucous, smooth; the enlarged calyx-lobes linear-oblong, blunt, 3-nerved, inconspicuously reticulate, shining, 3·5 in. long and ·6 to ·8 in. broad. Dyer in Journ. Bot. 1874, p. 103. *D. hirtus*, Vesque, Comptes-Rendus, 1874, 78, p. 627; Journ. Bot. 1874, p. 151; Dyer l. c. 154.

Malacca; Maingay (Kew Distrib.) No. 196.

Perak; Scortechini, No. 1955. DISTRIB. Borneo: (fide Dyer), Beccari, 779, 1883.

Burck (Ann. Jard. Bot. Buitenzorg, Vol. 6, p 196) reduces this to *D. Tamparan*, Korth. Korthals however describes the fruit of that species as having accrescent calyx-lobes 13 inches long by 3 broad.

2. DIPTEROCARPUS SCORTECHINII, King, n. sp. A large tree: young branches rather stout, densely clothed, (as are the short cylindric buds, the petioles and racemes) with large tufts of coarse, brownish, shining hairs. *Leaves* coriaceous, elliptic-ovate, or sometimes elliptic-sub-ovate, sub-entire, abruptly and shortly acuminate, slightly narrowed to the rounded base; upper surface glabrous or glabrescent, the nerves sparsely stellate-pubescent, the midrib tomentose; under surface sparsely stellate-pubescent, the nerves (and especially the midrib) with long silky hairs intermixed: main nerves 16 to 18 pairs, straight, oblique, very prominent beneath: length 6 to 7·5 in., breadth 3 to 3·5 in, petiole 1 to 1·2 in. *Racemes* few-flowered, short *Fruit* (? immature) ovoid, contracted under the mouth, glaucous, stellate-pubescent, ·75 in. long and ·5 in. in diam; accrescent calyx-lobes linear-oblong, reticulate, slightly narrowed in the lower half, the apex obtuse, obscurely 3-nerved (the middle nerve bold, the two lateral faint), 4 to 5 in. long and ·8 to 1 in. broad.

Perak; Scortechini, No. 1813.

This is closely allied to *D. crinitus*, Dyer, to which Scortechini doubtfully referred it. It differs from *D. crinitus* in its larger leaves and stellate-pubescent fruit. It has also a different time of flowering; for, as Scortechini remarks in his field notes, this is in immature fruit in the beginning of March, while *D. crinitus* does not come into flower until the end of April.

3. DIPTEROCARPUS SKINNERI, King, n. sp. A tall tree; young branches thin, deciduously tawny-pubescent. *Buds* cylindric, narrow, golden-sericeous. *Leaves* oblong-elliptic, narrowed in the upper half or third to the acute or shortly acuminate apex, slightly narrowed to the rounded base, upper surface glabrous or sparsely adpressed-pubescent, the midrib tomentose, the lower sparsely stellate-pubescent, the midrib and 16 to 19 pairs of straight oblique nerves adpressed-sericeous; nerves prominent on the lower, faint on the upper, surface when dry:

length 5 to 8 in., breadth 2·25 to 3 in.; petiole ·7 to ·9 in., tomentose. *Racemes* simple, short, 2- or 3-flowered, pubescent. *Flowers* 2·5 in. long. *Calyx* with narrowly campanulate tube, covered outside with minute, pale, stellate tomentum. *Petals* linear-oblong, blunt, more or less pubescent outside. *Fruit* (? immature) globular-ovoid, glabrous, ·65 in. in diam.: accrescent calyx-lobes glabrous, reticulate, linear, blunt, contracted at the very base, nearly 5 in. long and about ·75 in. broad.

Penang; at the back of West Hill, at an elevation of 1,000 feet. Curtis No. 1403.

A very distinct species known only by Mr. Curtis' scanty specimens. I have named it in honour of Mr. Skinner, Resident Councellor of Penang.

4. DIPTEROCARPUS TURBINATUS, Gaertn. f. Fruct. III. 51, t. 188. A tree 80 to 100 feet high: young shoots rather slender, at first minutely velvety, pale grey, afterwards glabrous: buds cylindric, softly pale pubescent *Leaves* thinly coriaceous, elliptic or ovate-elliptic, acute or shortly acuminate, the base rounded or sub-cordate, the edges slightly undulate, sometimes sub-crenate; both surfaces glabrous, or the lower puberulous especially on the midrib and nerves: main nerves 12 to 18 pairs, straight, oblique, prominent on the lower surface; length 4·5 to 11 in., breadth 2·5 to 5·25 in.; petiole 1 to 1·5 in., glabrous or pubescent: stipules tawny-velvety in the lower part but pubescent towards the apex. *Racemes* 3- to 5-flowered. *Flowers* 1·25 to 1·5 in. long. *Calyx*-tube obconic, glabrous, smooth, not winged. *Petals* linear-oblong, obtuse, more or less canescent. *Fruit* ellipsoid-ovoid, tapering to each end when young: globular when ripe and ·75 in. in diam., with neither wings nor ridges; the two accrescent calyx-lobes glabrous, conspicuously reticulate, obscurely 3-nerved, oblong-lanceolate, obtuse, 4 to 4·5 in. long and 1·25 in. broad; the three small lobes of the calyx deltoid, very short. Roxb. Hort. Beng. 42; Fl. Ind. II. 612; Corom. Plants III. 10 t. 213. Ham. in Mem. Wern. Soc. VI. 300: Wall Cat. 952; A. DC. Prod. XVI. 2, 607; W. and Arn. Prod. 85; Dyer in Hook. fil. Fl. Br. Ind. I, 295: Journ. Bot. 1874, p. 102 t. 143, fig. 13: Kurz. For. Fl. Burm. I. 114. *D. laevis*, Ham. l. c. 299.; A. DC. l. c. 607. W. and A. Prod. 85: Kurz, l. c. 114. ?*D. indicus*, Bedd. Forest. Rep. 1864-5, 17 cum tab.; Flora Sylvat. t. 94.

Assam, Cachar, Chittagong, Burmah, S. India.

VAR. *andamanica*: enlarged calyx-lobes linear-oblong, not oblanceolate, ·75 in. broad; leaves broadly ovate, sub-cuneate at the base.

South Andaman: common.

Following Dyer, I have included under this the plant named *D. laevis* by Buchanan Hamilton in the Memoirs of the Wernerian Society, Vol. VI. p. 299. Hamilton distinguishes his species *D. laevis* by its flattened branchlets, and perfectly glabrous leaves and petioles, while *D. tuberculatus* Gaertn. has terete branches and pubescent leaves and petioles. The former (called *Dulia Garjan*, by the natives of Chittagong) yields, he says, no wood-oil; while the latter (called *Telia Garjan*) does. The materials before me do not enable me to differentiate the two as species. Moreover, specimens sent to me by Dr. E. Thurston, Reporter on Economic Products to the Government of India, (and which had been collected by the Forest Officer of Chittagong under the vernacular names *Dulia* and *Telia Garjan*) appear exactly alike. Careful investigation in the field may however prove that there is some better basis for Hamilton's view than the trifling differences which he has noted in the outline of the branchlets and the pubescence of the leaves. I am not at all satisfied that the Southern Indian tree named *D. indicus* by Beddome is rightly reduced here. Better Herbarium specimens than any which I have seen, and investigation in the field, are I think required to settle this point also.

5. DIPTEROCARPUS KERRII, King, n. sp. A tall tree; all parts, except the petals, glabrous; young branches thin, slightly flattened at the tips, not annular. *Buds* narrow, cylindric. *Leaves* coriaceous, ovate-elliptic, acute or very shortly and bluntly acuminate, the edges undulate, the base cuneate; main nerves 8 to 11 pairs, oblique, straight, bold and shining on the lower surface; length 3 to 4 in., breadth 2 to 2·5 in., petiole ·9 to 1·1 in. *Panicles* short, spreading, few-flowered. *Flowers* 1·5 in. long. *Calyx-tube* glaucous. *Petals* linear-oblong, obtuse, more or less pubescent or tomentose towards their middle externally. *Fruit* turbinate, smooth, 1 to 1·15 in. in diam.; accrescent calyx-lobes linear-oblong, blunt, reticulate, 3-nerved, 4·5 to 5 in. long, and 1·25 to 1·5 in. broad: minor lobes very short, broad, rounded.

Malacca; Maingay (Kew Distrib.) No. 199, Griffith 727, Derry 1032. Pangkore; on Gunong Yunggal, Curtis No. 1561.

Mr. Curtis describes this as a very large tree yielding an oil. It resembles *D. Hasseltii*, Bl., but has much smaller leaves.

I have named this species in honour of Dr. Kerr, an enthusiastic Botanist much interested in the Malayan Flora. Closely allied to this, and perhaps identical with it, is the tree represented by Mr. Curtis' specimen (Waterfall, Penang) No. 1653. The young wood of the latter is however paler than that of *D. Kerrii* from Pangkore and Malacca, and the leaves are puberulous, not glabrous, beneath. I have seen no flowers of it.

6. DIPTEROCARPUS CORNUTUS, Dyer in Hook. fil. Fl. Br. Ind. I, 296. A tree 50 to 70 feet high: young branches stout, compressed, minutely

rufous-tomentose with a few scattered longer hairs. *Leaves* large, coriaceous, oblong, blunt at each end, the edges undulate or obscurely sinuate-crenate: upper surface glabrous, the midrib and nerves pale when dry: under surface densely covered with minute, pale, stellate tomentum: main nerves 16 to 20 pairs, prominent, spreading, straight, the transverse veins rather distinct: length 9 to 14 in., breadth 5 to 8 in., petiole 2 to 3 in.; stipules rufous-sericeous, the hairs fascicled. *Racemes* 7- or 8-flowered. *Flowers* 1·75 in long. *Calyx-tube* 5-winged, canescent, the short lobes very obtuse. *Petals* oblong or sub-spathulate, stellate-canescent. *Fruit* about 1 in. long, sub-globular, with 5 thick short wings in its upper half; enlarged calyx-lobes linear, obtuse, 5 or 6 in. long and 1·25 to 1·75 in. broad, shining, boldly 3-nerved, reticulate. Dyer in Journ. Bot. 1874, p. 103, t. 143. fig. 15. *Parinarium dillenifolium*, R. Br. Wall. Cat. No. 7520. *Petrocarya dillenifolia*, Steud. Nomencl. II, 309.

Singapore: Wallich. Malacca: Maingay (Kew Distrib.) No. 197. Penang: Curtis No. 1402. Perak: Wray, No. 4160.

It was Sir Joseph Hooker who first pointed out that the Wallichian plant No. 7520, issued as *Parinarium*, belongs really to this species.

7. DIPTEROCARPUS FAGINEUS, Vesque in Comptes-Rendus, tome 78, p. 626: Journ. Bot. for 1874, p. 149. A tree 40 to 80 feet high: young branches slender, at first minutely pulverulent tawny-pubescent, ultimately glabrescent or glabrous and dark-coloured, the buds cylindric. *Leaves* coriaceous, elliptic-ovate to elliptic-lanceolate, acute, the edges entire or sub-undulate-crenulate, the base cuneate, both surfaces puberulous especially on the midrib and nerves; main nerves 10 to 13 pairs, straight, oblique, prominent on the sub-glaucous lower surface; length 2·5 to 3·25 in., breadth 1·3 to 1·75. *Racemes* slender, 1- to 4-flowered. *Flowers* about 1·25 in. long. *Calyx-tube* campanulate, not constricted at the mouth, 5-angled. *Ripe fruit* ellipsoid, tapering more at the base than at the apex, 5-angled, glaucous, 1 in. long: accrescent calyx-lobes linear-oblong, obtuse, contracted at the base, 3-nerved, 2·5 to 3 in. long and about ·75 in. broad. *D. prismaticus*, Dyer Journ. Bot. 1874. pp. 104, 152. t. 144 fig. 17. *Dipterocarpus*, sp. Hook. fil. in Linn. Trans. XXIII, 161.

Perak: King's Collector No. 3527, Scortechini. Penang; Curtis No. 1401.

D. fagineus, Vesque, has been collected hitherto only in Borneo (Beccari No. 3008 and Motley No. 143,) and the leaves are described by Dyer as being papyraceous in texture and having about 8 pairs of lateral nerves. The leaves of the Perak tree which I now refer to this species, are coriaceous and have 10 to 13 pairs of nerves. The Perak plant may therefore belong to a distinct, but closely allied, species. Curtis' Penang specimens (No. 1401) are quite glabrous in all parts except the petals.

8. DIPTEROCARPUS OBLONGIFOLIUS, Blume, Mus. Bot. Lugd. Bat. II, 36. A tall tree: young branches glabrous, dark-coloured, sparsely lenticellate; buds cylindric. *Leaves* coriaceous, oblong or elliptic-oblong, shortly and bluntly acuminate, the edges sub-undulate, the base cuneate; both surfaces shining, glabrous, the midrib and 13 to 16 pairs of straight bold nerves with a few stellate hairs along their sides: length 6 to 8 in., breadth 2 to 2·75 in., petiole ·9 to 1·1 in. *Racemes* slightly supra-axillary, densely tawny-tomentose, bifurcating, each branch with 3 to 5 flowers and several linear membranous deciduous bracts. *Flowers* about 2·5 in. long. *Calyx-tube* fusiform, slightly contracted at the mouth, 1 in. long, boldly 5-angled, densely stellate tawny-tomentose as are the 3 minor calyx lobes; the 2 larger linear-oblanceolate lobes sparsely stellate-pubescent, boldly 1-nerved and with 2 obscure lateral nerves. *Ripe fruit* unknown. Miq., Fl. Ind. Bat. I, pt. 2, p. 498; A.DC. Prod. XXI. 2, 614; Dyer in Journ. Bot. 1874, 105. *D. stenopterus*, Vesque, Comptes-Rendus, tome 78, p. 625; Journ. Bot. 1874, p. 150.

Perak, Scortechini. DISTRIB. Borneo, Sumatra.

Except as regards inflorescence, the Perak specimens of this are practically glabrous. In Bornean specimens, however, the young parts, buds and petioles are fusco-tomentose. (Dyer l. c.)

9. DIPTEROCARPUS GRANDIFLORUS, Blanco, Fl. Filipp. Ed. 2, 314. A tree 80 to 120 feet high: young branches rather stout, sub-compressed, at first hoary-puberulous, but finally quite glabrous, nearly black when dry; leaf-buds shortly ovoid, minutely pale-canescent. *Leaves* coriaceous, ovate-elliptic, shortly acuminate; the base broad, rounded or sub-truncate, sub-cordate; the edges entire or obscurely undulate-crenate, both surfaces glabrous; main nerves 14 to 16 pairs, spreading, rather straight, prominent on the lower, obsolete on the upper, surface; length 6 to 9 in., breadth 3·5 to 5 in.; petiole 2 to 3 in. long, glabrous. *Racemes* about 4-flowered. *Flowers* articulated to the rachis, 2 in. long. *Calyx-tube* 5-winged from base to apex. *Petals* linear-oblong. *Fruit* oblong, 2·5 in. long, wings stout, ·5 in. or more in width; the 2 accrescent lobes of the calyx oblong, obtuse, glabrous, reticulate, 3-nerved, the mesial nerve the longest and most distinct, 7 to 9 in. long and 1·5 to 2 in. broad, the smaller calyx lobes sub-orbicular. A.DC. Prod. XVI., 2 p. 612; Dyer in Journ. Bot. 1874, p. 106, t. 145, fig 19; Burck in Ann. du Jard. Bot. Buitenzorg, vol 6, 201. *D. Blancoi*, Bl., Mus. Lugd. Bat. II.

35. *D. Motleyanus*, Hook. fil. in Trans. Linn. Soc. XXIII. 159. A.DC. in DC. Prod. XVI., pt. 2, 611. *D. pterygocalyx*, Scheff. Obs. Phyt. II. 35; Dyer in Hook. fil. Fl. Br. Ind. I, 298. *Mocanera grandiflora*, Blanco, Fl. Filipp. Ed. I, 451. *Anisoptera ?* Turcz. in Bull. Soc. Nat. Mosc. 1858, I, 233.

Malacca: Maingay (Kew Distrib.) No. 198. Penang: Curtis 424. Perak: Scortechini 152 b. DISTRIB. Bangka, Teysmann. (?) Philippines.

The late Father Scortechini's field notes contain the following account of the flower: "The petals of this are red inside in the middle, but pale towards the margins; the stamens are numerous, 2-seriate, united in a ring by their enlarged bases, falling off together: staminodes many, short, adpressed to the ovary. Ovary pubescent, scaly towards the base. Fruiting-calyx reddish." The species comes near *D. Griffithii*: but is distinguished from it by the characters which I have noted under that species. Flowers of *D. Griffithii* are, however, wanting for comparison.

10. DIPTEROCARPUS KUNSTLERI, King, n. sp. A tree 80 to 120 feet high; young branches flattened, at first sparsely covered with minute scurfy deciduous pubescence, ultimately glabrous, but always with oblique tawny-tomentose annuli. *Buds* narrowly cylindric, hoary-canescent. *Leaves* elliptic or sub-rotund-elliptic, very shortly acuminate, the base rounded or sub-cuneate, the edges undulate or sub-crenate, both surfaces glabrous: main nerves 16 to 18 pairs, oblique, straight, prominent on the lower surface: length 7·5 to 11 in., breadth 4·5 to 7 in., petiole 1·5 to 2 in. *Racemes* 6 to 8 in. long, often bifid, 4- to 6-flowered, glabrous. *Flowers* 2·5 to 3 in. long, glaucous. *Calyx-tube* narrowly obconic, 5-winged, glaucous. *Petals* linear, obtuse, glaucous. *Fruit* sub-globular, an inch or more long, with 5 wings about ·25 in. wide: accrescent calyx-lobes oblong, obtuse, slightly narrowed towards the base, glabrous, reticulate, 3-nerved, 6 or 7 in. long and about 1·25 in. broad.

Perak: King's Collector, Nos. 3638, 3798, 7508 and 7606.

Allied to *D. grandiflorus;* but with larger leaves, smaller fruit and different buds. Allied also to *D. Griffithii* but with smaller fruit and different buds. This species has leaves like *D. trinervis* Bl. and *D. retusus* Bl., but differs from these in having winged fruit: it also resembles *D. Dyeri*, Pierre, which, however, has longer leaves with hairy petioles and more narrowly winged fruit.

11. DIPTEROCARPUS GRIFFITHII, Miq. Ann. Mus. Lugd. Bat. I, 213. A tree 100 to 125 feet high: young branches stout, sub-compressed, minutely tawny-canescent; the leaf buds ovoid, densely covered with

yellowish-brown shining hair. *Leaves* coriaceous, broadly ovate, usually slightly narrowed to the rounded base, but sometimes the base truncately sub-cordate, the apex acute or shortly acuminate, both surfaces glabrous, the upper shining; main nerves 12 to 14 pairs, spreading, straight, slightly prominent on the lower surface: length 5 to 11 in., breadth 3 to 5·5 in., petiole 2·25 to 3·5 in. *Racemes* 3- or 4-flowered. *Flowers* 1·5 in. long. *Calyx* ob-conic, sub-glabrous, 5-winged. *Fruit* oblong, 2·5 in. long, the wings extending from base to apex, stout, ·5 in. or more broad: accrescent lobes of calyx oblong, obtuse, glabrous, reticulate, boldly 3-nerved, 5 to 7 in. long and about 1·75 in. broad. A. DC. in DC. Prod. XVI, Pt. 2, 611; Dyer in Hook. fil. Fl. Br. Ind. I, 299: Journ. Bot. 1874, 107. Kurz For. Flora Burm. I, 116. *D. grandiflorus* Griff. Notul. IV, 515 (not of Blanco).

S. Andaman: Kurz, King's Collector.

This closely resembles *D. grandiflorus*, Blanco, but the two may be readily distinguished by their young branches and leaf-buds. The young branches of this species are pale canescent and its leaf-buds broad and golden sericeous; while the branchlets of *D. grandiflorus* are quite glabrous and dark-coloured and the buds are narrow and pale canescent.

12. DIPTEROCARPUS INCANUS, Roxb. Hort. Beng. 42; Fl. Ind. II. 614. A tall tree: young shoots terete, stout, densely but minutely tawny-tomentose; the buds short, ovoid, thick, with longer tomentum than the branchlets. *Leaves* coriaceous, broadly ovate, acute or sub-acute, the base rounded or sub-cordate, the edges undulate; upper surface glabrous, the midrib alone slightly pubescent: under surface uniformly pale, shortly but softly stellate-pubescent, the midrib and nerves tomentose. main nerves 12 to 15 pairs, oblique, straight, prominent on the lower surface; length 5 to 8 in., breadth 2·5 to 4·75 in.; petiole ·8 to 1·25 in., pubescent. *Flowers* about 1 in. long, usually in racemes but occasionally in short 7- or 8-flowered panicles. *Calyx-tube* ob-conic, 5-winged, minutely tomentose. *Petals* oblong, obtuse. *Fruit* sub-globose, about 1 in. in diam., 5-winged from base to apex; the wings thin, from ·25 to ·5 in. broad; the 2 accrescent lobes of the calyx narrowly oblong, obtuse, glabrous, much reticulate, 3-nerved in the lower half, when mature 5·5 in. long and nearly 1·5 in. broad; the 3 minor lobes sub-orbicular. Wight & Arn. Prod. 84; A. DC. Prod. XVI. 2, 611; Dyer in Hook. fil. Fl. Br. Ind. I, 298; Journ. Bot. 1874, p. 106.

S. Andaman: common. DISTRIB. Burmah, Kurz, Herb. No. 2109 (in part).

The plant here described under the name *D. incanus* closely resembles *D. alatus*, Roxb.; but its flowers are shorter, the leaves are more broadly ovate, and have rounded or cordate, not cuneate, bases, while the pubescence of the lower surface is paler and more uniform and the young branchlets and leaf-buds are stouter. Moreover the accrescent lobes of the calyx are longer and nearly twice as broad: the 5 wings of the calyx-tube are also broader. Roxburgh's description of his species *D. incanus* is very brief; he left no drawing of it at Calcutta; and no authentic specimens of his own naming appear to exist. It is therefore impossible to decide with absolute certainty what Roxburgh's *D. incanus* is. At Kew Mr. Dyer accepts Kurz's Pegu specimen No. 2109 as belonging to it, and the specimens recently brought from the S. Andaman by my collectors agree with that number of Kurz's.

13. DIPTEROCARPUS ALATUS, Roxb. Hort. Beng. 42; Fl. Ind. II 614. A tree 80 to 125 feet high: young branches terete, rather stout, softly and minutely pubescent; the buds narrow, rufous-sericeous. *Leaves* coriaceous, ovate-elliptic, the apex acute, the base cuneate, the edges undulate: upper surface glabrous except the minutely tomentose nerves and midrib: lower sparsely and minutely stellate-pubescent, the 10 to 14 pairs of oblique rather straight prominent main nerves densely tomentose; length 5 to 8 in., breadth 2·75 to 4·5 in.; petiole 1 to 1·5 in, pubescent: stipules sericeous-pubescent. *Panicles* 6- or 7-flowered. *Flowers* about 1·5 in. long. *Calyx-tube* ob-conic, 5-winged, stellate-pubescent, as are the linear-oblong petals. *Fruit* globose, 1 in. in diam., puberulous, 5-winged from base to apex; the wings glabrous, thin and about ·5 in broad; the 2 accrescent lobes of the calyx linear-oblong, obtuse, glabrous, much reticulate, 3-nerved in the lower half, 4·5 in. long and ·7 or ·8 in. broad: the 3 unenlarged lobes obtuse. Wall. Cat. 953: A. DC. Prod. XVI. 2, 611 *in part*: Dyer in Hook. fil. Fl. Br. Ind. I, 298; Journ. Bot, 1874, p. 106 (excl. syn. *D. costatus*, Gaertn.) Kurz For. Flora Burm. I. 116; Pierre Flore Forest. Coch-Chine, t. 212. *Oleoxylon balsamiferum* Wall. Cat. p. 157.

Burmah: Wallich, Brandis, Helfer No. 730, Kurz. Andamans?

Gærtner's figure and description of his *D. costatus* are confined to the fruit only. The former is that of a *Dipterocarpus* with the elongated calyx-lobes of *D. alatus*, Roxb., but with the 5 wings on the tube of the calyx very narrow, whereas those of Roxburgh's *D. alatus* are very broad. Dyer (F. B. I. i, 298) expresses his belief that Gaertner's figure is a bad representation of *D. alatus*, Roxb., and he reduces Gaertner's *D. costatus* to Roxburgh's *D. alatus*. M. De Candolle, on the other hand, retains *D. costatus*, Gaertn. as a good species and in this he is followed by Kurz; but Messrs. Dyer and De Candolle agree that the *D. costatus* described by Roxburgh is a different plant from Gaertner's. For Mr. Dyer it is still a doubtful species; while M. De Candolle reduces it to *D. angustifolius* W. & A., which for Dyer is in its turn a doubtful species. A careful examination of the material now collected at Calcutta and at Kew leads me to believe that *D. costatus*, Gaertn., is a perfectly good species, and that the best character to distinguish it from Roxburgh's *D. alatus* is the narrowness of the wings of the calyx-tube. Specimens collected in Burmah by Kurz (No. 113 of his Herbm.) and by Brandis, have fruits exactly like that figured by Gaertner. Moreover I see no reason for thinking that the tree described by Roxburgh (Fl. Ind. II; 614) as *D. costatus*, Gaertn., is anything else than Gaertner's plant. Mr. Dyer (Journ. Bot. 1874, p. 153) expresses the opinion that *D. Lemeslei*, Vesque—a species collected on the island of Pulo Condor off the Cambodian coast—is reducible to *D. alatus*, Roxb.

It is very doubtful whether *D. alatus*, Roxb., occurs in the Andamans. I have seen no specimens of it from these islands, and I give it as an Andaman plant on the authority of the "Flora of British India."

Besides the preceding, there are various other species of *Dipterocarpus* in the Calcutta Herbarium from localities within the British Malayan region which, for want of sufficient materials, I am unable to describe. Chief amongst these are :—

(1) Curtis No. 1560 from Penang, a species with winged calyx-tube.

(2) A species from Perak, represented in Scortechini's collection (without number) by fruits resembling those of *D. Lowii* H., f., *D. intricatus*, Dyer, and *D. lamellatus*, Hook. fil.

(3) A species from the Andamans with leaves resembling those of *D. Griffithii*, Miq., but with globular fruit which has neither angles nor wings on the calyx-tube. This possibly may be a form of *D. pilosus*, Roxb.

(4) A Perak species (Herb. Scortechini mixed with No. 1478) represented by fruits something like those of *D. fagineus*, Vesque, but with the calyx-tube winged, not angled.

(5) A Perak species represented by leaf-twigs and loose fruit of a species resembling both *D. fagineus*, Vesque, and *D. gracilis*, Bl., but differing from both.

(6) A species from Perak (Wray No. 4031) having leaves like *D. Griffithii*, Miq., but with shorter petioles, and having also fruit rather like *D. Griffithii*, but the calyx-tube with narrower wings, and the minor calyx-lobes smaller.

2. ANISOPTERA, Korth.

Resinous trees. *Leaves* coriaceous, entire, feather-veined and finely reticulate; stipules small, fugacious or inconspicuous. *Flowers* in lax terminal panicles *Calyx-tube* very short, adnate to the base of the ovary; the segments imbricate, then subvalvate. *Stamens* ∞; anthers ovoid with a long subulate connective, outer valves larger. *Ovary* 3-(rarely 4- 5-) celled; style fleshy, ovoid or oblong, with an attenuate 3–5-fid apex; ovules 2 in each cell. *Fruit* adnate to the calyx-tube, indehiscent, 1-seeded, crowned by the accrescent calyx-segments, of which 2 form linear-oblong lobes. *Cotyledons* fleshy, unequal; radicle superior. —DISTRIB. Malay Peninsula and Archipelago to New Guinea. Species about 6.

1. ANISOPTERA CURTISII, Dyer MSS. A tree 80 to 120 feet high: young branches slender, minutely scurfy-tomentose. *Leaves* oblong, tapering to both ends, the apex sub-acute or acute, the base narrowed but rounded; the upper surface glabrous, shining, the lower densely ochraceous-lepidote and sparsely stellate-pubescent; main nerves 18 to 20 pairs, spreading: length 2 to 3·5 in., breadth ·75 to 1·25 in., petiole ·5 to ·75 in. Accrescent calyx-lobes 3·5 to 4·5 in. long, linear-spathulate, shining, 3-nerved: the transverse veins bold and numerous.

Penang: Curtis. Perak: King's Collectors.

Var. latifolia: leaves broadly elliptic, blunt, the bases rounded but narrowed.

Penang: Curtis, No. 1400.

The vernacular name of this in Penang is *Ringkong.*

3. VATICA, Linn.

Large or moderately sized resinous trees. *Leaves* coriaceous, entire, feather-veined and finely reticulate; stipules small, fugacious or inconspicuous. *Flowers* in axillary and terminal panicles, usually tomentose before expansion. *Calyx-tube* short, free, or adnate to the base of the ovary; segments somewhat acute, imbricate, then sub-valvate. *Stamens* 15; anthers oblong, external valves larger, connective apiculate. *Ovary* 3-celled; style short, subulate, or apex clavate or capitate; stigma entire or 3-toothed; ovules 2 in each cell. *Fruit* leathery, indehiscent, 1-seeded, surrounded by and sometimes partly adnate to the accrescent, membranous, nerved and reticulate calyx-lobes, two of which expand into narrow wings 2 or 3 in. long, the other three being much smaller. *Cotyledons* fleshy.

DISTRIB. Tropical Asia and chiefly Malaya; species about 10.

Synaptea is a genus established by Griffith (Notulæ IV., 516, Tab. 585 A, fig V.) for a tree collected at Mergui, and named by him *Synap-*

tea odorata. This plant has been named *Synaptea grandiflora* by Kurz, (Journ. A.S., Beng., 1870, 2, 65), and *Anisoptera odorata* Kurz, (For. Flor. Burm. I, 112), while Dyer has identified it with *Hopea grandiflora*, Wall, Cat. 958, and reduced it to *Vatica grandiflora* (F.B.I., i., 301).

The characters of the genus *Synaptea*, as given by its author, are practically those of *Vatica*, Linnæus (Mantissa II., p. 152-3, No. 1311), except that, whereas in the Linnæan description nothing is said about the fruit or its relation to the calyx, Griffith distinctly explains that he has given the name *Synaptea* because the ovary is adnate to the calyx. He does not say to what extent adnate, but, in fruiting specimens of his *Synaptea odorata*, the adhesion extends to the lower part only. In the "Mantissa" of Linnæus, only one species of *Vatica* is described, *viz.*, *V. chinensis;* and of the specimen thus named in the Linnæan Herbarium, Sir J. G. Smith publishes a figure (Smith Ic., ined., t. 36.). This figure however does not show clearly whether the base of the ovary is, or is not, adherent to the calyx, and the fruit is not figured at all. A reference to Linnæus' specimen ought to settle what *V. chinensis* really is; but unfortunately it has not settled it. I have not myself examined the actual Linnæan specimen; but the opinions of botanists who have examined it vary as to its identity. The plant is generally admitted not to be of Chinese origin, for no Dipterocarp is known to inhabit China. Wight and Arnot are of opinion (Prod. 84) that *Vatica chinensis* is the same as *Vatica laccifera*, W. A. (*Shorea Talura*, Roxb.—*fide* Dyer). Alph. De Candolle (Prod. XVI., 2, p. 619) keeps up the species *V. chinensis*, while Dyer (Fl. Br. Ind., I, 302) reduces it to *Vatica Roxburghiana*, Blume (Mus. Bot. Lugd. Bat. II, 31. t. 7.), Blume's *Vatica Roxburghiana*, being, as the citations and figure given by that author show, the *Vateria Roxburghiana* of Wight's Illustrations, p. 87, and Icones t. 26. It cannot be demonstrated, therefore, either from Linnæus' description or specimen, or from Smith's figure of the latter, whether Linnæus intended his genus *Vatica* to include only plants with the ovary and fruit free from the calyx, or whether plants in which there is such partial adhesion might not also be admitted. If the latter were the case there would be no occasion to keep up the genus *Synaptea*. This is the view adopted by Messrs. Hooker and Bentham, who remark of *Synaptea*, "*ex descriptione auctoris verisimiliter ad Vaticam referenda est.*" This view is also adopted by Dyer, in "Hooker's Flora of British India," where he reduces *Synaptea odorata*, Griff., to the genus *Vatica*, Section *Eu-Vatica*. This view is also to a certain extent adopted by Burck who (Ann. Jard. Bot. Buitenzorg) makes *Synaptea* a section of *Vatica*, characterised by having the lobes of the fruiting calyx unequally accrescent, two of them being much elongate, and *the fruit being partly inferior*; while the section *Eu-Vatica*, as proposed by Bentham and Hooker originally, and adopted by Burck, is characterised by having the same fruiting calyx as *Synaptea*; nothing being said about the adhesion between the calyx and the fruit. Pierre, on the other hand, keeps up *Synaptea* as a genus on account of the presence of albumen and the structure of the embryo (characters not easily worked in herbarium specimens of this family). In my own opinion it appears advisable to admit *Synaptea* as a section of *Vatica*, but to exclude *Isauxis*, *Retinodendron*, and *Pachynocarpus*, retaining these as distinct genera. *Vatica* would, according to this scheme, be divided into two sections :—

I. *Eu-Vatica* :—Fruit free from the accrescent calyx, *i.e.*, fruit superior.
II. *Synaptea* :—Fruit adnate in its lower part to the accrescent calyx, *i e.*, fruit half inferior.

Sect. I. EU-VATICA.—Fruit quite free from the calyx.
  Inflorescence and ripe fruit pale tomentose; flowers ·4 in. long ... ... 1. *V. perakensis.*
  Inflorescence and ripe fruit rusty-tomentose.
    Flowers ·25 in. long; nerves of leaves 13 to 15 pairs; petioles ·3 to ·4 in. long ... 2. *V. Lowii.*
    Flowers ·45 in. long; nerves of leaves 9 to 12 pairs; petioles ·6 to 1·5 in. long... 3. *V. Maingayi.*
Sect. II. SYNAPTEA —Calyx-wings adherent to the ripe fruit for nearly half its length.
  Leaves 9 to 10 in. long and with 18 to 20 pairs of nerves ... ... 4. *V. nitida.*
  Leaves 2·5 to 7 in. long, with 6 to 13 pairs of nerves.
    Larger lobes of calyx of fruit obovate and very blunt.
      Leaves with 6 to 8 pairs of faint nerves ... ... 5. *V. cinerea.*
      Leaves with 11 to 13 pairs of bold nerves ... ... 6. *V. Curtisii.*
    Larger lobes of calyx narrowly oblong.
      Leaves oblong or elliptic-oblong, with 9 to 11 pairs of nerves; petals narrowly oblong ... 7. *V. faginea.*
      Leaves broadly elliptic, with 11 to 13 pairs of nerves; petals broadly elliptic ... ... 8. *V. Dyeri.*

Leaves 2·5 to 3·5 in. long, with about 7 or 8
pairs of faint, main nerves, minutely reticulate. 9. *V. reticulata.*

1. VATICA PERAKENSIS, King, n. sp A tree 60 to 80 feet high; young branches slender, deciduously scurfily stellate-pubescent, the bark rather pale. *Leaves* thinly coriaceous, oblong-lanceolate, rarely oblanceolate, more or less bluntly acuminate, sometimes caudate, the base cuneate; both surfaces glabrous, the midrib on the upper puberulous; main nerves 10 to 12 pairs, rather prominent beneath; length 2·5 to 4 in., breadth ·8 to 1·3 in., petiole ·4 to ·5 in. *Panicles* axillary and extra-axillary, crowded near the ends of the branches, 1 to 2 in. long, minutely pale tomentose, as are the ovate-lanceolate calyx-lobes. *Flowers* ·4 in. long. *Petals* narrowly oblong, obtuse, glabrous. *Stamens* slightly apiculate. *Ovary* minutely tomentose; stigma conical. *Ripe fruit* ·3 in. in diam., globose, the style persistent, minutely tomentose, quite free from the calyx; the two accrescent calyx-lobes oblong-ob-lanceolate, obtuse, obscurely 5-nerved, 2·5 in. long and ·5 in. broad; minor lobes unequal, lanceolate-acuminate, the largest about ·85 in long.

Perak: King's Collector, Wray; a common tree. Pangkore: Curtis.

The nearest ally of this is *Vatica Bantamensis*, Benth. and Hook.; but that has rather larger and more coriaceous leaves, which are perfectly glabrous; larger flowers with petals scaly externally and a more scurfy inflorescence; moreover the whole of the accrescent calyx-lobes of its fruit are more coriaceous and the minor lobes are blunter.

2. VATICA LOWII, King, n. sp. A tree 60 to 80 feet high: young branches, petioles, inflorescence and calyx densely rusty, scurfy-tomentose with stellate hair intermixed, the branches ultimately glabrous and with dark bark. *Leaves* coriaceous, oblong, sub-acute, the base rounded; both surfaces glabrous, the midrib puberulous on the upper; main nerves 13 to 15 pairs, spreading, slightly prominent beneath; length 2·5 to 3·5 in., breadth 1 to 1·5 in., petiole ·3 to ·4 in. *Panicles* axillary and terminal, much crowded towards the ends of the branches; ·75 to 1·5 in. long. *Flowers* ·25 in. long. *Calyx-lobes* lanceolate, acuminate, oblique. *Petals* narrowly oblong, obtuse, almost glabrous. *Stamens* short, unequal-sided, apiculate. *Ovary* depressed, tomentose, style capitate. *Ripe fruit* globular, ·25 in. in diam, deciduously rufous-scurfy; the style persistent, quite free from the calyx. Two large calyx-wings narrowly oblong, sub-acute, scarcely narrowed at the base, 5-nerved, 2·75 to 3 in. long, and ·6 in. broad; the three smaller lobes sub-equal, about ·5 or ·6 in. long, lanceolate, obtuse.

Perak: Scortechini, No. 2108; King's Collector, No. 7496.

This species is closely allied to *V. Maingayi*, Dyer; but has smaller flowers, and rather larger leaves with considerably longer petioles.

3. VATICA MAINGAYI, Dyer, in Hook. fil, Fl., Br., Ind. I, 302. A tall tree: young branches slender, ultimately glabrous, but at first rusty furfuraceous-tomentose, as are the inflorescence, calyx and ripe fruit. *Leaves* coriaceous, oblong or obovate-oblong, shortly acuminate, the base rounded, glabrous on both surfaces; main nerves 9 to 12 pairs, slender, curving, spreading; length 3 to 4·5 in., breadth 1 to 1·75 in., petiole ·6 to 1·5 in. *Panicles* short, few-flowered. *Flowers* ·45 in. long. *Calyx-segments* oblong-lanceolate. *Ovary* depressed, rufous-tomentose. *Ripe fruit* globose, ·25 in. in diam., the style persistent, rufous-tomentose; free from the calyx; the two large wings linear-oblong, sub-acute, not contracted at the base, 5-nerved (the lateral nerves faint) 2 in. long and ·35 to ·5 in. broad; the 3 smaller lobes ovate, sub-acuminate, ·75 in. long, all glabrous.

Malacca: Maingay (Kew Distrib.) No. 209.

Of this I have seen only Maingay's specimens, which are not good.

4. VATICA NITENS, King, n. sp. A tree 40 to 50 feet high: young branches and petioles densely covered with coarse deciduous scaly stellate tomentum, ultimately cinereous. *Leaves* coriaceous, narrowly oblong, acuminate, slightly narrowed to the rounded base; both surfaces, but especially the upper, shining, glabrous, the base on the lower sparsely scaly-tomentose when young, finely reticulate; main nerves 18 to 20 pairs, spreading, prominent on the lower surface: length 9 to 10 in., breadth 2 in.; petiole ·5 in., stout. *Ripe fruit* globular, crowned by the persistent style, reticulate, ·5 in. in diam., adnate for half its length to the calyx; the two large wings of the calyx oblong, slightly ob-lanceolate, obtuse, 3 in. long and ·8 to ·9 in. broad, the 3 shorter wings ovate-acuminate, ·8 in. long; all boldly 5-nerved and shining.

Penang: Curtis, No. 1404.

This fine species is known only by Mr. Curtis' imperfect specimens. It is very distinct, being at once recognisable amongst the Indian species of *Vatica* by the size of its leaves and calyx-wings.

5. VATICA CINEREA, King, n. sp. A tree about 40 feet high: young branches rufescent-puberulous at the very tips, otherwise glabrous and cinereous. *Leaves* thinly coriaceous, ovate-oblong to ovate-lanceolate, sub-acute, the base rounded or sub-cuneate; both surfaces glabrous, finely reticulate when dry; main nerves 6 to 8 pairs, spreading, faint; length 2·25 to 3·5 in., breadth ·75 to 1·5 in., petiole ·3 to ·5 in. *Panicles* mostly axillary, spreading, rusty scurfy-tomentose, 1·25 to 2 in. long. *Flowers* ·45 in. long. *Calyx-lobes* sub-equal, lanceolate, sub-acute, tomentose on both surfaces. *Petals* oblong-lanceolate, sub-acute, the half of the outer surface which is outside in æstivation pubescent, other-

wise glabrous. *Stamens* obtusely apiculate. *Ovary* depressed, minutely tomentose; stigma capitate. *Fruit* (not quite ripe) globular, umbonate, attached for half its length to the calyx. The two larger calyx-wings ob-lanceolate-oblong, obtuse or sub-acute, 5-nerved, flocculent-puberulous near the base when young, ultimately glabrous, 2 in. long and ·5 in. wide; the 3 smaller wings lanceolate, obtuse, ·5 in. long.

Langani: Curtis, Nos. 2797 and 2798. Kedah: Curtis, Nos. 2096 and 2514.

When dried, the leaves of this are of a dull gray colour—hence the specific name. Its fruit resembles that of the next species, but the leaves have fewer and less prominent nerves.

6. VATICA CURTISII, King, n. sp. A tree about 40 feet high: young branches, petioles, infloresccense and calyx brownish scurfy-pubescent, ultimately glabrous. *Leaves* ovate-oblong, sub-acute, the base rounded, both surfaces quite glabrous, reticulate; main nerves 11 to 13 pairs, oblique, rather prominent beneath; length 3 to 5 in., breadth 1·3 to 2·5 in., petiole ·3 to ·45 in. *Racemes* axillary, few-flowered, 1 to 1·25 in. long. *Flowers* ·35 in. long. *Calyx-lobes* unequal, the 2 longer narrowly oblong, obtuse; the 3 shorter lanceolate-acuminate. *Petals* elliptic, slightly oblique, blunt, glabrous except the pubescent edge which is external in the bud. *Ripe fruit* globular, ·3 in. in diam., adherent to the calyx for half its length, the larger calyx-lobes oblong-obovate, usually obtuse, rarely sub-acute, 5-nerved, 1·75 to 2 in. long, and ·7 in. broad; the smaller wings about ·4 in. long.

Penang: Curtis, No. 1579.

7. VATICA FAGINEA, Dyer in Hook. fil. Fl. Br. Ind., I., 301. A tree 80 to 100 feet high: young branches slender, minutely cinereous stellate-tomentose as is the inflorescence. *Leaves* coriaceous, oblong or elliptic-oblong, finely reticulate, glabrous; main nerves 9 to 11 pairs, spreading, curving, thin but prominent when dry; length 4 to 5 in., breadth 1·5 to 2 in. *Panicles* 2·5 in. long; flowers ·5 in. long. *Calyx-tube* ribbed, minutely scurfy tomentose, the lobes unequal. *Petals* narrowly oblong, blunt, glabrous except the pubescent outside edge. *Ovary* hemispheric, minutely tomentose; stigma capitate, lobed. *Ripe fruit* globular, adherent for half its length to the calyx, about ·25 in. in diam., the style persistent; the 2 larger calyx-wings narrowly oblong, or oblong-oblanceolate, obtuse, obscurely 5-nerved, 2 to 2·5 in. long, and ·5 to ·7 in. broad near the apex; the three smaller wings unequal, sub-spathulate, less than ·5 in. long. *Hopea faginea*, Wall. Cat. 963 *Shorea pinangiana*, Wall., Cat. p. 157. *Synaptea faginea*, Pierre, For. Flore Coch.-Chine, t. 242.

Penang: Wallich. Perak: King's Collector, Nos. 3686 and 3765.

8. VATICA DYERI, King, n. sp. A tree 80 to 130 feet high: young branches, panicles, and calyx on both surfaces densely rufous-flocculent-tomentose, with stellate hairs intermixed, the branches ultimately glabrous and their bark pale. *Leaves* membranous, usually broadly elliptic, rarely elliptic-oblong, sub-acute or very shortly and bluntly acuminate, the base rounded, both surfaces quite glabrous, finely reticulate: main nerves 11 to 13 pairs, spreading, rather prominent beneath: length 3·5 to 7 in., breadth 1·6 to 3 in.; petiole ·35 to ·5 in., flocculent-tomentose. *Panicles* axillary or terminal, cymose, 1·5 to 3 in. long. *Flowers* ·4 in long. *Calyx lobes* unequal, the two larger oblong and obtuse; the three smaller lanceolate, acuminate. *Petals* broadly elliptic, very obtuse, slightly narrowed to the truncate base, much larger than the calyx-lobes, glabrous, except one of the outside edges which is adpressed-pubescent. *Stamens* short, unequal-sided, bluntly apiculate *Ovary* depressed-pubescent, the stigma capitate. *Ripe fruit* conical, the two large accrescent calyx-wings narrowly oblanceolate-oblong, blunt, 5-nerved, 1·25 in. long and ·25 in. broad; the three smaller wings one-fourth of the size of the larger, lanceolate, obscurely 5-nerved. *Synaptea Dyeri*, Pierre Fl. Forest. Coch-Chine, t. 241.

Perak: King's Collector, No. 7662. DISTRIB., Cambodia, Lower Cochin-China, Pierre.

The Perak specimens are not in fruit: but in flowers and leaves they agree with Pierre's specimens from Cambodia and Cochin-China.

9. VATICA RETICULATA, King, n. sp. A tree 60 to 80 feet high: all parts except the inflorescence glabrous; young branches slender, dark-coloured. *Leaves* coriaceous, oblong to ovate-lanceolate, tapering from the middle to each end; the apex bluntly acuminate, the base very cuneate and slightly unequal-sided, the edges sub-undulate; both surfaces finely reticulate when dry, the lower paler; main nerves 8 or 9 pairs, little more prominent than the secondary; length 2·5 to 3·5 in., breadth 1 to 1·25 in., petiole ·4 in. *Panicles* axillary or terminal, puberulous, 2·5 to 3·5 in. long, lax, few-flowered. *Flowers* on long pedicels. *Calyx-lobes* unequal, lanceolate, more or less obtuse, densely pubescent on both surfaces. *Ovary* hemispherical, ridged, densely tomentose; style short, glabrous; stigma minute. *Young fruit* sub-globular; fruiting calyx with 2 accrescent linear-oblong wings, the other smaller; all attached to the lower part of the fruit.

Perak: King's Collector, No. 6969.

The only specimens which I have seen of this are without corolla, stamens, or ripe fruit. The species is, however, a very distinct one, and it is an unmistakeable *Vatica*. I have therefore ventured to name it in spite of the imperfection of the material.

4. PENTACME, A. DC.

Glabrous or puberulous resinous trees. *Leaves* broad, entire, penninerved, with obtuse or cordate bases. *Flowers* large, panicled. *Calyx-tube* short, the lobes imbricate, 2 being quite external. *Stamens* 15, the filaments short, dilated; anthers much larger than the filaments, elongate, linear; the valves 4, sub-equal, each subulate at its apex, the connective also prolonged into a stiff deflexed arm as long as the appendages of the anther-valves. *Ovary* free; the style filiform, the stigma slightly lobed. *Fruit* enclosed within the imbricate calyx-lobes, of which two or more have elongated membranous reticulate many-nerved wings. Species 3,—Burmese, Siamese, and Malayan.

1. PENTACME MALAYANA, King, n. sp. A tree 40 to 50 feet high: young branches rather stout, dark-coloured, glabrous. *Leaves* sub-coriaceous, rotund-ovate to broadly elliptic, the apex shortly and bluntly acuminate, the base rounded or slightly emarginate; both surfaces glabrous, pale when dry; main nerves 15 to 18 pairs, spreading, prominent on both surfaces; length 5 to 7 in., breadth 2·75 to 4·5 in., petiole ·75 to 1·1 in. *Panicles* axillary, lax, few-flowered, 2·5 to 5 in. long. *Flowers* ·75 in. long and about as much in diameter when open, pedicelled. *Calyx-lobes* more or less broadly ovate, acuminate, minutely tomentose outside. *Petals* three times as long as the calyx, elliptic, spreading, puberulous on one-half outside, and glabrous on the other, quite glabrous inside. *Stamens* 15, equal, erect, the filaments short and broad; the anthers elongate, narrow, with 5 apical awns, one of which is deflexed and rather shorter and thicker than the other four. *Ovary* ovoid, sub-glabrous, much shorter than the filiform style: stigma minute. *Ripe fruit* ovate, apiculate, 1 in. long, glabrous; calyx-wings all enlarged and reticulate except at the base; the three outer narrowly oblong, obtuse, and narrowed to the concave base, 9-nerved, 4 to 4·5 in. long, and ·65 to ·75 in. broad; the two inner lobes much narrower and fewer-nerved, about 2·5 in. long, or even shorter.

Langkani: Curtis, No. 2095.

The petals of this species are spreading, and the flower has quite an unusual *facies* for the order. It is at once distinguished by its curiously 5-awned anthers. Four of these awns are the produced apices of the anther cells, the fifth (the thicker and deflected one) is a prolongation from the connective.

5. SHOREA, Roxb.

Glabrous, mealy, or pubescent resinous trees. *Leaves* entire or sub-repand, pinnate-veined; stipules large, coriaceous and persistent, or minute and fugacious. *Flowers* in axillary or terminal, lax, cymose panicles; bracts persistent, caducous, or 0. *Sepals* ovate or lanceolate, imbricate, 3 being external and 2 internal. *Stamens* 15 or 20, or 30; anthers ovate or oblong, rarely linear; connective subulate-cuspidate, rarely inappendiculate; valves obtuse, rarely cuspidate, equal, or the outer slightly larger. *Ovary* 3-celled, cells 2-ovuled; style subulate, stigma entire or 3-toothed. *Fruit* with leathery, rarely with woody, pericarp, 1-celled, 1-seeded, closely surrounded by the bases of the persistent, usually accrescent, sepals, the 3 outer, or more rarely, all, and sometimes none, of which are developed into 7- to 10-veined reticulate membranous linear-oblong wings. *Cotyledons* fleshy, unequal, usually enclosing the superior radicle. DISTRIB—Tropical Asia and chiefly the Malayan Archipelago: species about 60.

Sect. I. EU.-SHOREA. Fruit little more than ·5 in. long, its pericarp leathery: three of the persistent sepals developed into membranous wings many times longer than the fruit.

Anthers without apical appendages.
  Lower surface of adult leaves minutely stellate-tomentose, not scaberulous ... 1. *S. leprosula.*
  Lower surface of adult leaves glabrescent, the axils of the nerves scaly ... 2. *S. scutulata.*
  Lower surface of adult leaves quite glabrous, of young leaves glaucous ... 3. *S. Curtisii.*
Anthers mostly inappendiculate, a few with a minute apical appendage from the connective.
  Stamens 30 ... ... 4. *S. sericea.*
Anthers with very short apical appendages from the connective; flowers sessile.
  Leaves 2·5 to 4 in. long, the lower surfaces minutely pubescent: flower ·25 in. long; fruit ovoid-globose, its largest wings 2·5 in. long 5. *S. parvifolia.*
  Leaves 3 to 4·5 in. long, glabrous beneath: flower ·3 in. long: fruit turbinate, its largest wings 3·5 in. long ... ... 6. *S. acuminata.*
  Leaves 4 to 6 in. long, glabrescent or glabrous beneath; fruit narrowly ovoid, its longest wings 3·5 to 4·5 in. long. ... 7. *S. macroptera.*
Apical appendage from the connective much longer than the anther.
  Leaves glabrous on both surfaces, the lower not pale.
    Stamens 10 (?) ... ... 8. *S. Maxwelliana.*
    Stamens 20 ... ... 9. *S. gratissima.*

- Stamens 15
  - Flowers ·2 to ·25 in. long.
    - Main nerves of leaves 9 to 10 pairs, faint; petals not saccate at base; ovary ovoid-conical, tomentose, style short ... ... 10. *S. Ridleyana.*
    - Main nerves 6 or 7 pairs; petals saccate at base; ovary hemispheric, style long and slender ... 8. *S. Maxwelliana.*
  - Flowers ·4 in. long, main nerves 9 to 11 pairs; style 3 times as long as the globose ovary ... ... 11. *S. pauciflora.*
  - Flowers ·5 in. long, main nerves of leaves 6 to 8 pairs; ovary elongate-conic, style short, petals linear-oblong ... ... 12. *S. Kunstleri.*
  - Flowers ·65 in. long: nerves of leaves 12 to 16 pairs; ovary ovoid, style long, filiform, petals ovate-lanceolate 13. *S. bracteolata.*
- Leaves glaucous beneath ... ... 14. *S. glauca.*
- Apical appendage of the connective with 3 to 5, or many ciliæ.
  - Stamens 30: ciliæ radiating from the tip of the apical process of all the anthers 15. *S. ciliata.*
  - Stamens 20: apical appendages of all the anthers with numerous ciliæ; petals broad, spreading ... ... 16. *S. utilis.*
  - Stamens 15: anthers of outer row with ciliate apical appendages ... ... 17. *S. costata.*
- Anthers with a single apical appendage from each cell, and a short one from the connective; sepals imbricate at their bases only ... 18. *S. stellata.*

Species imperfectly known.

- Bracteoles large, persistent, scaberulous, stellate-pubescent ... ... 19. *S. Maranti.*
- Stipules large, paired, persistent ... 20. *S. eximia.*

Sect. II. PACHYCHLAMYS, (Dyer). Fruit more than 1 in. long, its pericarp thick and woody, embraced in its lower half by a cup formed of the enlarged sepals, the bases of which are thickened woody and concave, the apices of the outer three produced into membranous wings as long as, or slightly longer than, the fruit.

Anthers of inner row inappendiculate, those
of the other two rows appendiculate ... 21. *S. Thiseltoni.*

1. SHOREA LEPROSULA, Miq. Fl. Ind. Bat. Suppl. I., 487. A tree 100 to 150 feet high: young branches rather slender, lenticellate, minutely and deciduously pale stellate-tomentose. *Leaves* coriaceous, elliptic to oblong, acute or sub-acute, the base rounded; upper surface glabrous, harsh from the prominent minute reticulations, the midrib and nerves sometimes puberulous; lower surface minutely fuscous-tomentose, with numerous densely stellate hairs on the midrib nerves and veins; main nerves 10 to 13 pairs, straight, oblique, prominent beneath; length 3 to 6 in., breadth 1·25 to 3·25 in., petiole ·35 to ·75 in. *Panicles* axillary and terminal, 1·5 to 4 in. long, rachis and branches stellate-tomentose, the short flower-bearing branchlets sericeous. *Flowers* in two rows, secund, ·3 in. long, sessile. *Sepals* ovate, minutely velvety outside. *Petals* three times as long as the sepals, sericeous outside, oblong-spathulate. *Stamens* about 15; the filaments dilated, much longer than the short ovate inappendiculate anthers. *Ovary* ovoid, minutely tomentose, tapering upwards into the long slender style; stigma minute. *Ripe fruit* narrowly ovoid, apiculate, minutely tomentose, 6 in. long. *Calyx-wings* all enlarged and membranous, concave at the base so as to embrace the ripe fruit, but not adnate to it; the three outer narrowly oblong, sub-acute at the apex, narrowed at the base, 7-nerved, reticulate, 3 in. long and about ·7 in. broad; the two inner smaller, about 1 in. long, ovate, caudate-acuminate, not nerved. A. DC. Prod. XVI. 2, 631. Scheff. in Tijdschr. Ned. Ind. XXXI, 350: Hook. fil. Fl. Br. Ind., I., 305. Burck in Ann. Jard. Bot. Buitenzorg, VI, 215. *Shorea astrosticta*, Scortechini MSS.

Malacca: Maingay (Kew. Distrib.), No. 203. Perak, King's Collector, Nos. 7646, 7905, 8182; Scortechini, No. 2063. DISTRIB. Sumatra.

2. SHOREA SCUTULATA, King, n. sp. A large tree; young branches with dark lenticellate bark and minute white stellate pubescence. *Leaves* elliptic, shortly abruptly and bluntly acuminate; the base broad, rounded, almost truncate: upper surface glabrous, minutely reticulate; the lower, and especially the midrib, sparsely stellate-puberulous when young, glabrescent when old, the sides of the midrib, and especially the pits in the axils of the nerves, with numerous minute brownish pale-edged scales; length 3 to 3·5 in., breadth 1·5 to 1·75 in., petiole ·3 in. *Panicles* axillary and terminal, 3 to 4 in. long, the branches short, each bearing 2 or 3 bracteolate flowers; bracts broadly ovate, concave, blunt, hoary-puberulous, deciduous. *Flowers* ·4 in. long, shortly pedicelled. *Sepals* broadly lanceolate, obtuse, tomentose outside, glabrous inside. *Petals* oblong, obtuse, the base expanded

at one side, glabrous inside and on one half outside, pubescent on the other. *Stamens* 15, in 3 rows; all the filaments broad, those of the outer two rows shorter than those of the inner: anthers short, broadly ovate, inappendiculate. *Ovary* conical, pale tomentose: style short, stigma small. *Fruit* (perhaps not mature) ovoid, apiculate, minutely pale tomentose, ·6 in. long. *Sepals* all enlarged, membranous, reticulate, concave at the base; the three outer narrowly oblong, obtuse, very little narrowed to the base, 7-nerved, 2·75 in. long and ·75 in. broad; the two inner ·8 in. long, linear, about 1-nerved.

Penang: Curtis, No. 1396.

A species known only from Penang, and collected only by Mr. Curtis: remarkable for its almost racemose inflorescence, and curiously glandular leaves.

3. **Shorea Curtisii**, Dyer MSS. in Herb. Kew. A tree 100 to 150 feet high; young branches slender, at first minutely stellate-puberulous, ultimately dark-coloured and glabrous. *Leaves* coriaceous, oblong-lanceolate, bluntly acuminate; the base sub-cuneate, or almost rounded; upper surface of young leaves minutely pubescent, of adults glabrescent or quite glabrous, the lower uniformly covered with very minute rufescent (young), or pale (adult) tomentum: main nerves 10 to 14 pairs, ascending, rather straight, prominent beneath: length 3 to 4 in., breadth 1·2 to 1·4 in., petiole ·4 to ·6 in. *Panicles* axillary or terminal, 2 to 3 in. long, the rachis slender, glabrous. *Flowers* about ·3 in. long, in distichous secund rows of 4 or 5, on the short lateral branchlets, enveloped while in bud by broad deciduous puberulous bracts. *Sepals* ovate, tomentose outside, glabrous inside, slightly unequal. *Petals* twice as long as the calyx, linear-oblong, obtuse, stellate-pubescent outside, glabrous inside. *Stamens* 15, in three rows; the filaments elongate, broad (those of the outer row longest); anthers short, ovoid-globose, not apiculate. *Ovary* elongated ovoid, tomentose in the upper, glabrous in the lower half: *style* short, *stigma* small. *Ripe fruit* narrowly ovoid, apiculate, ·75 in. long, pale tomentose; *calyx-wings* all enlarged and membranous, free from the fruit: the three outer linear-oblong, 8-nerved, 2·25 in. long, and about ·5 in. broad; the two inner about 1 in. long, bluntly spathulate and with fewer nerves.

Penang: Curtis, Nos. 427, 1394 and 1395.

Perak: King's Collector, No. 8143.

The vernacular name of this in Penang is *Maranti Tai.*

4. **Shorea sericea**, Dyer in Hook. fil. Fl. Br. Ind., I., 306. A tree 50 to 60 feet high; young branches rugulose, warted and scurfily

rufous-tomentose as are the inflorescence and petioles. *Leaves* coriaceous, oblong or elliptic-oblong (rarely slightly ob-ovate), very shortly acuminate or sub-acute, slightly narrowed to the rounded or sub-cuneate base; upper surface shining, sparsely stellate-tomentose, the depressed midrib and nerves puberulous; lower surface scaberulous, more densely stellate-pubescent, especially on the bold midrib and 20 to 22 pairs of stout spreading main nerves; length 3·5 to 6·5 in., breadth 1·5 to 2·75 in., petiole ·6 to ·8 in. *Panicles* axillary and terminal, 3 to 7 in. long, the ultimate branches bearing 4 or 5 distichous, secund, bracteate, sessile flowers; bracts broadly ovate, puberulous outside. *Sepals* ovate, the two inner smaller, all densely golden-sericeous outside, glabrous inside. *Petals* like the sepals and of about the same length, the inside and one-half of the outer glabrous, the other half adpressed-sericeous. *Stamens* about 40, in several rows; the filaments of the outer shorter, all longer than the anthers; anthers ovate, mostly inappendiculate, a few with a minute appendix. *Ovary* elongated, conic, sericeous; the style short, glabrous; stigma small. *Fruit* (immature) narrowly ovoid, ·5 in. long, embraced by, but not adnate to, the accrescent membranous calyx-wings: the outer 3 calyx-wings linear-oblong obtuse, narrowed to the base, 3·5 in. long and ·6 in. broad, 10-nerved; the 2 inner 2·5 in. long and much narrower and fewer-nerved, sparsely pubescent.

Malacca: Maingay (Kew. Distrib.) No. 202. Penang: Curtis, No. 431. Perak: King's Collector, No. 3511.

This resembles *S. lacunosa* Scheff., but differs in not having persistent stipules. Its vernacular name in Penang is *Seraya.*

5. SHOREA PARVIFOLIA, Dyer in Hook. fil. Fl. Br. Ind., I., 305. A tree 100 to 150 feet high; young branches slender, pale tomentose at first, ultimately glabrous, dark-coloured and lenticellate. *Leaves* coriaceous, ovate to ovate-lanceolate, caudate-acuminate, the base sub-cuneate or almost rounded; upper surface glabrous (when young the midrib tomentose or pubescent); under surface sparsely scaly-pubescent when young, when adult minutely pubescent, the transverse veins thick; main nerves 9 to 12 pairs, oblique, rather straight, prominent beneath: length 2·5 to 4 in., breadth 1 to 1·8 in.; petiole ·35 to ·45 in., tomentose when young. *Panicles* axillary and terminal, crowded near the ends of the branches, 2 to 4 in. long, rather lax, spreading, many-flowered, minutely tomentose, the branches distichous. *Flowers* ·25 in. long, secund, distichous, deciduously bracteate. *Sepals* slightly unequal, ovate, acute, tomentose outside, glabrous inside. *Petals* twice as long as the sepals, obliquely elliptic, obtuse, glabrous, except on one-half outside which is silky. *Stamens* 15, or fewer: the filaments flatten-

ed, about 4 times as long as the broad short anthers; apiculus of connective very slender, about as long as the anther, deflexed. *Ovary* elongate, puberulous; style rather short; stigma small. *Ripe fruit* ovoid-globose, ·4 in. long, thinly adpressed pale tomentose. *Sepals* all enlarged and membranous, concave at the base so as to embrace the ripe fruit, but not adnate to it: the three outer narrowly oblong, obtuse at the apex, slightly narrowed to the base; 7-nerved, 2·5 in. long; the two inner from one-half to one-third shorter, narrower and fewer nerved. *Shorea disticha*, Scortechini MSS. in Herb. Calcutta.

Malacca: (Kew Distrib.) No. 206. Penang: Curtis, No. 201. Perak: Scortechini, No. 1965. Wray, No. 1282.

6. SHOREA ACUMINATA, Dyer in Hook. fil. Fl. Br. Ind., I., 305. A tree 100 to 150 feet high; young branches minutely greyish tomentose, ultimately dark-coloured and glabrescent. *Leaves* coriaceous, ovate to lanceolate, acuminate, the base often unequal-sided, rounded or sometimes emarginate; upper surface glabrous except the puberulous midrib; the flower glabrous, with a few scattered stellate hairs: main nerves 7 to 9 pairs, spreading, slightly prominent beneath: length 3 to 4·5 in, breadth 1·75 to 2·5 in.; petiole ·3 to ·4 in., tomentose. *Panicles* axillary and terminal, crowded near the extremities of the branches, 2 to 3 in. long, minutely stellate-pubescent, many-flowered. *Flowers* ·3 in. long, distichous, secund, about 5 on each lateral branch, bracteolate. *Sepals* ovate, unequal, tomentose outside, glabrous inside. *Petals* twice as long as the calyx, spreading, broadly ovate, puberulous outside, glabrous inside. *Stamens* 15, in three rows, the inner row shorter: filaments broad, much larger than the short, ovate, minutely appendiculate anthers. *Ovary* ovoid, tapering, pubescent: style short, stigma small. *Ripe fruit* turbinate, with 3 slightly vertical grooves, apiculate, puberulous, ·5 in. in diam., attached by its base to the calyx: *sepals* all enlarged, concave at the base so as completely to cover the fruit, membranous and reticulate; the 3 outer narrowly oblong obtuse, contracted towards the base, 10- or 11-nerved, 3·5 in. long, and 7 in. broad; the two inner 1 to 1·5 in. long, under ·25 in. broad, 3- to 4-nerved.

Malacca: Maingay (Kew Distrib.) No. 205 (?). Griffith, No. 1762.

Perak: King's Collector, No. 8009.

7. SHOREA MACROPTERA, Dyer in Hook. fil. Fl. Br. Ind. I, 308. A tree 60 to 80 feet high: young branches with dark-brown bark, minutely lenticellate and puberulous. *Leaves* coriaceous, oblong (usually narrowly), shortly acuminate, the base sub-cuneate or rounded: upper surface glabrous, shining, the midrib and nerves puberulous: lower

surface glabrescent or glabrous, chocolate-coloured when dry: main nerves 10 to 12 pairs, curved, spreading, prominent on the lower surface; length 4 to 6 in., breadth 1·35 to 1·75 in.; petiole ·4 to ·5 in., rugose. *Panicles* axillary or terminal, 4 to 7 in. long, lax, branching, few-flowered, puberulous, sparsely scaly. *Flowers* about ·5 in. long, sessile, solitary, not secund. *Sepals* distinct almost to the base, slightly unequal, broadly-ovate, acute, more or less yellowish-tomentose outside, glabrous inside. *Petals* narrowly oblong, slightly oblique at the base, the apex blunt, glabrous except one-half of the outer surface which is sericeous. *Stamens* 15, in two rows; filaments broad except at the apex, those of the outer two rows by much the shorter: anthers short, ovate, the connective minutely awned. *Ovary* elongated-ovoid, sericeous in its upper half; style short, stigma small. *Ripe fruit* ·6 to ·75 in. long, narrowly ovoid, pale puberulous, apiculate: *sepals* all enlarged and reticulate, slightly concave at the base and embracing, but not adnate to, the fruit; the three outer narrowly oblong, obtuse, tapering slightly to the auricled base, 7-nerved, 3·5 to 4·5 in. long, and ·8 to 1 in. broad; the two inner variable, but shorter, narrower and fewer nerved. *Shorea auriculata*, Scortechini MSS. in Herb., Calcutta.

Malacca: Maingay. Singapore: Ridley. Penang: Curtis, No. 1392. Perak: very common, King's Collector, Scortechini.

A species from Borneo which closely resembles this appears to me to differ specifically. Its leaves are longer with sparser nerves, and its calyx-wings are longer.

8. SHOREA MAXWELLIANA, King, n. sp. A tree 60 to 80 feet high: young branches dark-coloured, almost glabrous. *Leaves* coriaceous, ovate-lanceolate, acuminate (caudate-acuminate when young), the base unequal-sided, cuneate; both surfaces quite glabrous, the upper shining, the lower chocolate-coloured when dry: main nerves 6 or 7 pairs, curved, spreading, thin and inconspicuous: length 3 to 4 in., breadth 1·3 to 1·5 in., petiole ·4 in. *Panicles* axillary and terminal, 2·5 to 3 in. long, stellate-puberulous, their lateral branches very short and few-flowered. *Flowers* shortly pedicelled. *Sepals* unequal, oblong, blunt, with enlarged concave bases, more or less pubescent, but glabrous in the concavity of the base inside. *Petals* oblong, concave and saccate at the base, tomentose outside, glabrous inside. *Stamens* 10 (?), the filaments short, broad; the anthers elongate, erect, pointed, the connective ending in an awn as long as the anther. *Ovary* hemispheric; the style long, slender; stigma minute. *Fruit* (not mature) globular, minutely tomentose, closely invested by, but not adnate to, the concave bases of the sepals: *sepals* all enlarged, membranous, narrowly oblong, obtuse;

the three outer 7-nerved, 1·5 in. long and ·4 in. broad; the two inner similar in shape, but fewer-nerved and only ·5 in. long.

Perak: King's Collector, Nos. 3601 and 3744.

The only flowers of this species which I have seen are in an early stage of bud, and from them I am unable to make out the characters of the petals properly. The stamens appear to be only 10 in number: but of this I cannot now be quite certain.

9. SHOREA GRATISSIMA, Dyer in Hook. fil. Fl. Br. Ind. I, 307. A tree: younger branches slender, glabrescent, dark-coloured. *Leaves* coriaceous, elliptic, acuminate, the base broad and rounded, the margins sub-undulate, both surfaces glabrous: main nerves 12 to 14 pairs, faint; length 2·5 to 4 in., breadth 1·25 to 1·5 in., petiole ·6 to ·75 in. *Panicles* axillary and terminal, lax, few-flowered, 3 to 6 in. long, sub-puberulous. *Flowers* secund, pedicelled, ·25 in. long. *Sepals* lanceolate, sub-acute; minutely tomentose outside, glabrous inside in the lower, adpressed-pubescent in the upper, half. *Petals* twice as long as the calyx and much broader, elliptic, obtuse, glabrescent. *Stamens* about 20; the filaments short, unequal, dilated. *Anthers* elongated-ovate, truncate, each with a terminal awn from the connective twice as long as itself. *Ovary* ovoid, sub-glabrous; stigma small. *Ripe fruit* unknown. *Hopea gratissima*, Wall. Cat. 960.

Singapore: Wallich.

This is known only by Wallich's specimens. He referred it to *Hopea*, of which genus it certainly has the *facies:* the æstivation of the sepals is moreover that of *Hopea*, and so is the apiculus of the connective of the stamens. The petals in shape, however, resemble those of *Shorea*. I retain it in *Shorea* in deference to the opinion of Mr. Dyer.

10. SHOREA RIDLEYANA, King, n. sp. A tree 60 or 80 feet high: young branches slender, dark brown, lenticellate, nearly glabrous. *Leaves* ovate-lanceolate, shortly acuminate, the base rounded: both surfaces glabrous, the upper shining: main nerves 9 or 10 pairs, curved, spreading, thin but slightly prominent beneath: length 2·5 to 4 in., breadth 1·1 to 2 in.; petiole ·4 to ·5 in., rugulose. *Panicles* axillary and terminal, 1·5 to 2 in. long, densely stellate-puberulous. *Flowers* ·2 in. long, pedicellate. *Sepals* sub-equal, oblong, obtuse, tomentose outside, glabrous inside. *Petals* oblong, slightly oblique, obtuse, glabrous inside, puberulous outside on one half, glabrous on the other. *Stamens* 15, sub-equal, the filaments dilated in the lower half: anthers shorter than the filaments, ovate, the connective produced into an awn longer than the anther. *Ovary* ovoid-conical, minutely tomentose. *Style* short; stigma minute. *Fruit* (immature) ovoid, apiculate, minutely

pale tomentose: *sepals* all enlarged, membranous, reticulate and concave at the base; the three outer linear-oblong, obtuse, slightly narrowed to the concave base, 5-nerved, 2·25 in. long and ·4 in. broad; the two inner of the same shape, but only 1-nerved, narrower and only 1·5 in. long.

Perak: King's Collector, Nos. 3571 and 3617.

This a good deal resembles *S. Maxwelliana*, King; but its leaves have more nerves, its slightly oblique petals are not saccate at the base, its ovary is ovoid-conical, and minutely tomentose with a short style; whereas in *S. Maxwelliana* the petals are saccate at the base, and the ovary is hemispheric with a long style.

11. SHOREA PAUCIFLORA, King, n. sp. A tree 50 to 90 feet high: young branches slender, their bark brown puberulous and lepidote. *Leaves* thinly coriaceous, from oblong to elliptic, shortly acuminate; the base abruptly cuneate, slightly unequal-sided, or (in the elliptic forms) almost rounded: main nerves 9 to 11 pairs, oblique, straight, prominent beneath: length 4 to 5 in., breadth 1·8 to 2·5 in., petiole ·6 to ·7 in. *Panicles* few, axillary or terminal, few-flowered, 1·75 to 4 in. long, rather coarsely pubescent. *Flowers* ·4 in. long, secund, shortly pedicellate, each subtended by an ovate, solitary, puberulous, deciduous bract. *Sepals* broadly ovate, tomentose outside, glabrous inside. *Petals* broadly elliptic, obtuse, concave at the base, veined, inside glabrous, the outside half glabrous and half adpressed-sericeous. *Stamens* 15, in 3 rows: the outer row smaller and with filiform filaments, the inner rows with filaments longer and expanded in the lower half; the anthers of all shortly ovate, the connective produced into an awn twice as long as the stamen. *Ovary* hemispheric, tomentose; style nearly 3 times as long, puberulous; stigma small. *Ripe fruit* unknown.

Penang: Curtis, No. 1537.

A species known only by Mr. Curtis' specimens which have no fruit.

12. SHOREA KUNSTLERI, King, n. sp. A tree 60 to 100 feet high: young branches slender, rusty-puberulous, their bark brown. *Leaves* coriaceous, elliptic, abruptly and shortly acuminate, the base rounded or slightly cuneate, both surfaces glabrous, the lower with a few stiff white hairs on the midrib and nerves; main nerves 6 to 8 pairs, curved, ascending, prominent on the lower surface; length 4 to 5 in., breadth 2 to 2·4 in., petiole ·5 in. *Panicles* axillary and terminal, 4 to 6 in. long, lax, few-flowered, scaly-puberulous. *Flowers* ·5 in. long, sub-sessile, 4 or 5 together on the short branches of the panicles, secund, bracteate: the bracts broadly ovate, puberulous. *Sepals* sub-equal,

broadly ovate, acute, tomentose outside; the edges ciliate, glabrous inside. *Petals* linear-oblong, obtuse; the bases obliquely expanded, sericeous externally, glabrous internally. *Stamens* 15, sub-equal, the filaments as long as the anthers, flattened; anthers ovate, short, the connective terminated by a curved awn much longer than the stamen. *Ovary* elongate-conic, puberulous; style short. *Ripe fruit* hemispheric, tapering into a cone and crowned by the style, adpressed pale tomentose. *Sepals* membranous, reticulate: the three larger narrowly oblong, obtuse, tapering to the concave non-reticulate base, 9-nerved, 3·5 in. long and ·7 in. broad: the two inner 2 in. long, linear, 3-nerved.

Perak: King's Collector, Nos. 3474 and 3705.

This species is allied to *S. bracteolata*, Dyer, but its leaves have fewer nerves, smaller flowers, narrower petals, and a short style.

13. SHOREA BRACTEOLATA, Dyer in Hook. fil. Fl. Br. Ind. I, 305. A tree 50 to 150 feet high; young branches minutely furfuraceous-puberulous, speedily glabrescent, their bark dark-coloured. *Leaves* coriaceous, elliptic-oblong, shortly acuminate (often sub-obtuse when old), narrowed slightly to the rounded or emarginate base; upper surface quite glabrous; the lower yellowish furfuraceous-puberulous to glabrous; main nerves 12 to 16 pairs, spreading, prominent beneath: length 4 to 6 in., breadth 1·6 to 2·5 in., petiole ·45 to ·6 in. *Panicles* axillary, few-flowered, 2·5 to 6 in. long, glabrous. *Flowers* ·65 in. long, shortly pedicellate, each subtended by 2 elliptic, obtuse, 3-nerved, puberulous, deciduous bracts ·35 in long. *Sepals* lanceolate, obtuse, minutely tomentose outside, the two inner smaller. *Petals* ovate-lanceolate, obtuse; the bases expanded, glabrous. *Stamens* 15, in two rows, the filaments less than half as long as the ovate obtuse anthers; appendix of connective subulate, twice as long as the anther, decurved when old. *Ovary* ovoid, attenuated upwards, sub-glabrous; the style long, filiform; stigma small. *Ripe fruit* ovoid, apiculate, ·6 in. long, embraced by, but (except at the very base) free from the calyx; *sepals* accrescent, membranous, reticulate and concave at the base: the three outer narrowly oblong, blunt, slightly narrowed above the concave base, 10-nerved, 3·5 in. long, and ·6 in. broad; the two smaller about 2 in. long, and ·2 in. broad, about 3-nerved. *Shorea foveolata*, Scortechini MSS. in Herb. Calcutta.

Malacca: Maingay (Kew Distrib.) No. 204. Penang: Curtis, Nos. 322 and 1405. Perak: King's Collector, Nos. 7583, 7591, 7717; Scortechini, No. 1939. DISTRIB.—Sumatra. Forbes, No. 3050.

14. SHOREA GLAUCA, King, n. sp. A tree 80 to 100 feet high; young branches slender, dark-coloured, puberulous. *Leaves* coriaceous, ovate-lanceolate, acuminate; the base broad, rounded; upper surface

glabrous, the lower glaucous (except the midrib and nerves) especially when young; main nerves 7 to 9 pairs, ascending, rather straight: length 3·5 to 4·5 in., breadth 1·4 to 1·8 in.; petiole ·45 to ·6 in., rugulose, glaucous. *Panicles* axillary, few-flowered, shorter than the leaves, hoary, the *flowers* on short pedicels. *Sepals* slightly unequal, oblong, obtuse, tomentose on both surfaces. *Ovary* conical, tomentose; the style very short, glabrous; stigma small, 3-lobed. *Fruit* (immature) ovoid-globose, apiculate, minutely tomentose; accrescent sepals membranous, free from the fruit; obscurely 7- to 12-nerved, strongly reticulate, blunt, slightly narrowed to the concave base, at first puberulous but ultimately glabrous; the longer 2·25 in. long, and ·6 to ·75 in. broad, the others smaller.

Penang: Curtis, No. 372. Malacca: Maingay (Kew Distrib.), 212.

In this species the two inner fruiting wings of the calyx are nearly as large as the three outer; the leaves are very white underneath when young, but much less conspicuously so when adult. It is known, only by Curtis' and Maingay's specimens, none of which have complete flowers. Maingay's specimens from Malacca have in fact no flowers; but there is no mistaking their leaves as being exactly like those of Mr. Curtis' from Penang. The vernacular name of this is *Dammar laut dhan lesor.*

15. SHOREA CILIATA, King, n. sp. A medium-sized tree; young branches slender, dark-coloured, deciduously hoary-puberulous. *Leaves* coriaceous, lanceolate or oblong-lanceolate, acuminate, the base cuneate; both surfaces glabrous, minutely reticulate, the lower whitish when young, pale brown when dry; main nerves 8 or 9 pairs, ascending, curved, shining on the lower surface: length 3 to 3·5 in., breadth ·8 to 1·5 in., petiole ·75 to ·9 in. *Panicles* 2 to 2·5 in. long, axillary and terminal, little-branched, few-flowered, hoary. *Flowers* ·5 in. long, secund. *Sepals* ovoid-deltoid, obtuse, outside tomentose, inside glabrous. *Petals* three times as long as the sepals, narrowly oblong, obtuse, slightly expanded at the base, adpressed-sericeous outside, glabrescent inside. *Stamens* 30, in fascicles of 3, unequal, the shorter with undilated filaments, the longer with filaments dilated in the lower half; all with the connective produced into an apical process crowned by 3 to 5 spreading ciliæ. *Ovary* ovoid-conic, sericeous, with a short glabrous style. *Fruit* (immature) ovoid, apiculate, pale-tomentose, ·5 in. long; accrescent sepals membranous, reticulate: the three outer narrowly oblong, reticulate, 7-nerved: the two inner 2 in. long, and ·3 in. broad, narrowed to above the concave base: the two inner 1 in. long, linear-lanceolate, few-nerved.

Penang: Curtis, No. 1578.

Known only by Curtis' specimens, and readily recognisable by its beautifully ciliate-crested anthers.

16. SHOREA UTILIS, King, n. sp. A large tree; all parts except the inflorescence glabrous: young branches slender, dark-coloured. *Leaves* coriaceous, ovate-lanceolate, caudate-acuminate, or shortly and abruptly acuminate, the base slightly cuneate; main nerves about 7 pairs, oblique, not prominent on either surface; length 2·5 to 3 in., breadth ·9 to 1·2 in., petiole ·4 in. *Panicles* axillary, stellate-puberulous, about as long as the leaves; their lateral branches distant, very short, minutely tomentose, 3- or 4-flowered. *Flowers* sub-sessile, globular in bud, under ·2 in. long. *Sepals* ovate-orbicular, blunt, the outer 3 very tomentose outside, the inner 2 less so; all glabrous inside. *Petals* broadly oblong, blunt, more or less sericeous in both surfaces. *Stamens* 20; filaments slightly dilated, about as long as the ovate anthers; apical process of connective about as long as the anther, ciliate *Ovary* sericeous, elongated-conic, gradually tapering into the short glabrous style; stigma minute. *Ripe fruit* ovoid, apiculate, pale, adpressed-sericeous, ·4 in. long, closely invested by, but free from, the concave bases of the accrescent sepals. *Sepals of fruiting calyx* all enlarged, membranous, reticulate, deciduously puberulous; the 3 outer oblong, very obtuse, 5-nerved, 1·25 in. long, and ·4 in. broad; the inner 3 half as long, or less, and much narrower.

Penang: Curtis, No. 423.

This species, which Mr. Curtis describes as yielding the most durable timber in Penang, was at one time quite common there, but it is now almost extinct. Its vernacular name is *Dammar laut.*

17. SHOREA COSTATA, King, n. sp. A tree; young branches dark-coloured, lepidote-puberulous. *Leaves* thinly coriaceous, oblong, sub-acute, slightly narrowed to the rounded or sub-cuneate base; both surfaces glabrous, the transverse veins distinct, especially on the lower: main nerves 11 to 13 pairs, oblique, rather straight, slightly prominent beneath; length 3 to 4·25 in., breadth 1·2 to 1·5 in., petiole ·8 to 1 in. *Panicles* axillary and terminal, 1·5 to 2·5 in. long, scaly-puberulous, the lateral branches very short and few-flowered. *Flowers* small. *Sepals* broadly ovate, yellowish-tomentose outside, glabrous inside. *Stamens* 15; all with dilated filaments longer than the ovate anthers, those of the inner row with the apical process of the connective short and glabrous, those of the outer rows with longer ciliate apical connectives. *Ovary* ovoid-conical, densely yellowish-tomentose; style very short. *Ripe fruit* ovoid, apiculate, sparsely puberulous, ·75 in. long; sepals all enlarged, concave and dilated at the base, membranous and reticulate; the three outer narrowly oblong, obtuse, much

narrowed to the base, 7-nerved, 2·75 in. long, and ·45 in. broad; the two inner of the same shape, but few-nerved, only 1·5 in. long, and ·25 in. broad.

Penang: Curtis, No. 199.

A species known only by Mr. Curtis' solitary specimen. The connectives of the inner anthers are ciliate, somewhat in the fashion of *S. ciliata*, King; but the leaves of that species are very different.

18. SHOREA STELLATA, Dyer in Hook. fil. Fl. Br. Ind. I, 304. A tree 100 to 150 feet high; young branches slender, at first stellate-puberulous, but speedily glabrous, with bark dark-coloured and sparsely lenticellate. *Leaves* thinly coriaceous, ovate-lanceolate, the base rounded: upper surfaces glabrous, the lower very minutely lepidote on the reticulations; main nerves 8 to 11 pairs, rather straight, oblique, prominent on the lower surface; length 4 to 5·5 in., breadth 1·75 to 2·25 in., petiole ·7 to ·9 in. *Panicles* axillary or terminal, crowded at the extremities of the branches, many-flowered, 4 to 6 in. long; minutely stellate-pubescent. *Flowers* ·25 in. in diam. *Calyx* minutely greyish-tomentose, the segments ovate-oblong, sub-acute, valvate, erect. *Petals* broadly ovate, obtuse, pubescent outside, spreading. *Stamens* 15, the filaments short, broad; the anthers linear-elongate, shortly bi-mucronate, the connective also shortly mucronate. *Ovary* ovate-globular, grooved, very tomentose; the style short; the stigma ovoid, small. *Ripe fruit* ovoid, apiculate, tomentose, ·5 in. long; sepals all enlarged, sub-equal, membranous, linear-oblong, sub-acute, much narrowed at the base, quite free from the fruit, 5-ribbed, reticulate, 4·5 in. long, and about ·6 in. broad. *Parashorea stellata*, Kurz, Journ. As. Soc., Bengal, for 1870, pt. 2, p. 66. For. Flora Burm., I, 117; Pierre Flore Forest. Coch-Chine, t. 224.

Perak: King's Collector, No. 7505. DISTRIB. Burmah.

None of the Perak specimens are in fruit; but in leaves and flowers they agree absolutely with Kurz's Burmese specimens. The calyx in all is quite valvate, and it was on this character chiefly that Kurz based the genus *Parashorea*.

19. SHOREA MARANTI, Burck in Ann. Jard. Bot. Buitenzorg, VI. 217. A small tree: young branches dark-coloured, stellate-puberulous. *Leaves* thinly coriaceous, more or less broadly elliptic or elliptic-oblong, shortly abruptly and bluntly acuminate; the base broad, rounded, or almost truncate; upper surface glabrous, the midrib and nerves minutely tomentose or pubescent when young; lower surface more or less sparsely minutely stellate-puberulous, the sides of the midrib, especially at the axils of the main nerves, glandular and densely covered with masses of brown pale-edged scales: main nerves 12 to 16 pairs, oblique,

slightly curved, thin but prominent beneath when dry, as are the transverse veins; length 3·5 to 6·5 in., breadth 1·5 to 2·25 in.; petiole ·35 in., densely stellate-pubescent, scurfy. *Stipules* deciduous, ovate-lanceolate, nerved, stellate-puberulous. *Panicles* axillary and terminal, few-flowered, tawny-tomentose, (shorter than the leaves [?]); the bracts in pairs, unequal, elliptic-oblong, blunt, nerved, pubescent on both surfaces. "Segments of calyx (fide Burck) unequal, the three outer larger, imbricate. *Petals* minutely tomentose inside. *Stamens* 15, in two rows." *Hopea? Maranti*, Miq. Fl. Ind. Bat. Suppl., 489; A. DC. Prod. XVI, 2, p. 635.

Perak: King's Collector, No. 880. Malacca: Derry, No. 952. DISTRIB. Sumatra, Bangka.

The Perak specimens are not in flower; and I have seen none from elsewhere that are. The above imperfect description of the flower has therefore been copied from Burck (Ann. Jard. Bot. Buitenzorg, VI. 217). The Perak specimens perfectly agree, as to leaves, with an authentic specimen of Miquel's from Sumatra, in the Calcutta Herbarium. Miquel never saw either flower or fruit. In fact, of the twenty new species of *Dipterocarpeæ* described by this author in the supplement to his Flora of the Netherlands India, the flowers are described in only two, and in these but partially!

20. SHOREA EXIMIA, Scheff. in Nat. Tijdschr. Ned. Ind. XXXI, 349. A shrub or small tree; young branches petioles and under-surfaces of leaves stellate-setulose. *Leaves* coriaceous, elliptic-oblong, or ob-lanceolate-oblong, acuminate, narrowed to the rounded or sub-cuneate base: upper surface glabrous except the tomentose midrib, shining, the nerves depressed: under surface scabrid, pale brown, the reticulations midrib and 17 to 21 pairs of spreading nerves prominent: length 6·5 to 11 in., breadth 2·25 to 3·25 in., petiole ·25 to ·35 in. Stipules in pairs, persistent, ovate, acuminate, longer than the petioles, reticulate, laxly pubescent and warted. "*Wings of fruiting-calyx* linear-lanceolate, obtuse: the three larger narrow at the base, 3·2 to 3·6 in. long, ·5 in. broad, sparsely pubescent, 9-nerved; the two shorter and narrower 1·6 in. long. *Fruit* elongated-ovoid, acuminate, minutely whitish-tomentose." Burck in Ann. Jard. Bot. Buitenzorg VI, 218. *Vatica? eximia*, Miq. Fl. Ind. Bat. Suppl. 486; A. DC. Prod. XVI, 2, 623. *Vatica sub-lacunosa?* Miq. Fl. Ind. Bat. Suppl. 486. *Shorea sub-lacunosa*, Scheff. in Nat. Tijdschr. Ned. Ind. XXXI, 350: A. DC. Prod. XVI, 2623.

Malacca: Griffith, No. 5018. Penang: King. Perak: King's Collector, 10998. DISTRIB. Sumatra, Bangka.

This plant is very imperfectly known. I have copied the description of the fruit from Dr. Burck (l. c.). Miquel, who first described the plant as a probable *Vatica*, had seen nothing but a leaf-twig. Specimens brought from Perak by the Calcutta collectors bear, instead of flowers, curious cones, 1·5 in. long, of distichous imbricate bracts, concerning which Griffith, in his field note on his specimen No. 5018, wrote,—"irregular growth caused by an insect; each of the scales of these cones bears on its dorsum at its base a number of eggs." Griffith's No. 5019 appears to belong to a closely allied, but distinct, species; as also does the indeterminate plant issued by Wallich as No. 6635 of his catalogue, under the designation, "*Dilleniacea* [?] *nervosa*."

21. Shorea Thiseltoni, King, n. sp. A tree 60 to 80 feet high: young branches rather stout, the bark dark-coloured and lenticellate, but covered at first by a pale-grey, deciduous pellicle. *Leaves* coriaceous, elliptic-oblong to elliptic, rarely oblong, sometimes slightly obovate, obtuse, slightly narrowed to the rounded base; both surfaces glabrous, the lower when very young sparsely lepidote, puberulous especially on the midrib and nerves, brown when dry: main nerves 8 or 9 pairs, ascending, slightly curved, bold and prominent on the under surface like the midrib; length 5 to 7 in., breadth 2·5 to 3·25 in.; petiole ·6 to ·8 in., stout. *Panicles* axillary and terminal, 2 to 3 in. long, velvety, few-flowered, apparently ebracteolate. *Flowers* sessile, ·6 or ·7 in. long. *Sepals* ovate, sub-acute, unequal; the 3 outer tomentose outside, glabrous inside; the 2 inner smaller, nearly glabrous, the edges ciliate. *Petals* much longer than the sepals, linear-oblong, obtuse, expanded at the base, glabrous, except one-half of the outer surface which is adpressed-pubescent. *Stamens* 15, in 3 rows, the filaments of all dilated, unequal: the anthers shortly ovate, those of the inner and longer row inappendiculate, those of the other two rows with a short apical appendage from the connective. *Ovary* narrowly conical, tomentose, tapering into the short glabrous style; stigma minute. *Ripe fruit* narrowly ovoid, apiculate, minutely pale-tomentose, substriate, 1·2 in. long, and ·6 in. in diam., the pericarp thick and woody. *Persistant sepals* with much thickened concave woody bases, forming a cup embracing the lower half of the fruit, the apices of the outer three prolonged into membranous linear-oblong obtuse wings exceeding the fruit and sometimes 1·5 in. long; one of the inner sepals shortly winged, the other often broad, obtuse and not winged.

Perak: common. King's Collector.

In this plant the fruit is much larger than in any of the other species of *Shorea* here described, and its pericarp is hard and thick. The bases of the sepals are greatly thickened and concave, and they form a cup which embraces closely, but does not adhere to, the lower half of the fruit, the apices of some of them being winged as above described. In these respects the species resembles certain other Malayan species of *Shorea*, e. g., *S. Martiniana* Scheff, *S. scaberrima*, and *S. stenoptera*, Burck. Judging from the leaf-specimens on which Miquel founded his *Hopea Singkawang*, that plant must be a close ally of this. A species (flower only) collected by H. O. Forbes in Sumatra (Herb. No. 2952) must also be closely allied to this. It differs however by its conspicuously bracteolate inflorescence. Beccari's Nos. 2681 and 3507, which form the types of Heim's species *S. brachyptera*, are also allied to this.

6. HOPEA, Roxb.

Glabrous or hoary-tomentose resinous trees. *Leaves* quite entire, firm, feather-veined; stipules small, deciduous or inconspicuous. *Flowers* sessile or shortly pedicelled, ebracteate, in lax panicles of unilateral racemes. *Sepals* inserted on the receptacle, two being quite external and three for the most part internal, obtuse, imbricate. *Petals* falcate, their apices inflected in bud. *Stamens* 15, or rarely 10, slightly connate; the connective subulate-cuspidate, the anthers ovate, their valves obtuse, equal. *Ovary* 3-celled, the cells 2-ovuled: style shortly cylindric or subulate. *Fruit* 1-seeded, closely surrounded by the bases of the accrescent sepals, the 2 external of which are developed into linear wings, the three internal not longer than the ripe fruit. *Embryo* as in *Shorea*.—DISTRIB. of *Shorea*; species about 35.

Sect. I. EU-HOPEA, Main nerves of leaves bold and prominent.	
Nerves of leaves 16 to 18 pairs; accrescent sepals 4 to 4·5 in. long, 10-nerved ...	1 *H. nervosa.*
Nerves of leaves 10 to 13 pairs; accrescent sepals 1·75 to 2·5 in. long, obscurely 5-nerved	2. *H. Curtisii.*
Sect. II. DRYOBALANOIDEA, Miq. Main nerves not distinct.	
Petals sericeous: the filaments longer than the anthers; ripe fruit ·3 in. long, the accrescent sepals 7-nerved, 1·75 to 2 in. long, and ·2 to ·25 in. broad; leaf-petioles ·25 to ·4 in. long, minutely tomentose...	3. *H. micrantha.*
Petals densely sericeous; the filaments shorter than the anthers; ripe fruit ·2 in. long; accrescent sepals obscurely 5- to 7-nerved, 1·25 to 1·5 in. long, and ·25 in. broad; leaf-petioles ·35 to ·6 in. long, slender, puberulous, finally glabrous	4. *H. intermedia.*

1. Hopea nervosa, King, n. sp. A tree 50 to 70 feet high: young branches dark-coloured, glabrous. *Leaves* coriaceous, oblong to elliptic-oblong, shortly acuminate, the base rounded or very slightly cuneate; both surfaces glabrous; main nerves 16 to 18 pairs, spreading, bold and prominent on the lower; length 3·5 to 5 in., breadth 1·5 to 2·25 in.; petiole ·5 to ·75 in., transversely wrinkled when dry. *Flowers* unknown. *Ripe fruit* ovoid-rotund, apiculate, glabrous, ·5 in. long; the two outer sepals much enlarged, oblong-lanceolate, obtuse, slightly narrowed to the concave thickened smooth base, 10-nerved, 4 to 4·5 in. long, and ·6 to ·75 in. wide; the three inner sepals not quite so long as the fruit, broadly ovate, obtuse, thickened, smooth, closely embracing but not adherent to the fruit.

Perak: King's Collector, No. 3690.

This is a very distinct species, belonging to the group of *Hopea* with the nerves of the leaves bold. It is so distinct that, contrary to my general practice, I venture to name it without having seen the flower.

2. Hopea Curtisii, King, n. sp. A tree 50 to 60 feet high: young branches slender, dark-coloured, lenticellate, almost glabrous. *Leaves* coriaceous, broadly ovate to ovate-oblong, shortly acuminate or acute, the base slightly unequal-sided, rounded, rarely sub-cuneate; both surfaces glabrous, the upper slightly puberulous on the midrib near the base, the lower with several hairy glands at the base, the midrib sparsely and minutely stellate-puberulous; main nerves 10 to 13 pairs, curving, ascending, prominent beneath; length 3·5 to 4·5 in., breadth 1·75 to 2·5 in.; petiole ·4 in., puberulous when young. *Panicles* axillary and terminal, lax, few-flowered. *Flowers* about ·2 in. long, pedicelled. *Sepals* broadly ovate, blunt, concave, tomentose outside, glabrous inside; the inner two rather smaller and more glabrous than the others. *Petals* oblong, oblique, falcate, obtuse, partially tomentose outside, glabrous inside. *Stamens* 10, the filaments short, dilated; anthers ovate, short, the connective with an apical awn longer than the anther. *Ovary* broadly ovate, puberulous at the truncate apex, otherwise glabrous: style short. *Ripe fruit* ovoid, apiculate, pale striate, ·3 in. long; outer two sepals accrescent, narrowly-oblong, reticulate, membranous, obscurely 5-nerved, obtuse, slightly narrowed to the concave smooth base, 1·75 to 2·5 in. long and from ·35 to ·6 in. broad; the three inner non-accrescent sepals about as long as the fruit.

Penang: Curtis No. 1562. Perak: King's Collector, 8161.

3. Hopea micrantha, Hook. fil. in Trans. Linn. Soc., xxiii, 160. A tree 60 to 80 feet high: young branches slender with dark-coloured, lenticellate bark and minute brownish pubescence. *Leaves* coriaceous,

ovate-lanceolate or oblong-lanceolate, bluntly caudate-acuminate; the base slightly cuneate or sometimes broad, rounded and slightly unequal; both surfaces glabrous except the pubescent midrib: main nerves numerous, not much more prominent than the secondary, and both indistinct; length 2 to 4 in., breadth ·8 to 1·75 in.; petiole ·25 to ·4 in. minutely tomentose. *Panicles* axillary and terminal, numerous, short, spreading, 1 to 1·5 in. long, puberulous or glabrous. *Flowers* ·15 to ·25 in. long, shortly pedicellate. *Sepals* sub-equal, ovate-rotund, subacute or obtuse, puberulous and resinous outside, glabrous inside. *Petals* twice as long as the sepals, broadly oblong-obtuse, silky outside except on one side, glabrous inside. *Stamens* about 12, the filaments dilated in the lower half, longer than the ovate anthers; the connective produced into a single apical awn longer than the stamen. *Ovary* elongated, often constricted in the middle, glabrous; style very short, stigma minute. *Ripe fruit* ovoid, apiculate, ·3 in. long, striate, closely embraced by the 3 inner sepals which about equal it in length; the outer two sepals accrescent, oblanceolate, obtuse, tapering to the concave base, reticulate, 7-nerved, 1·75 to 2 in. long, and ·2 to ·25 in. broad. A. DC. Prod. XVI. 2, p. 634. Dyer in Hook. fil. Fl. Br. Ind. I, 310. Burck in Ann. Bot. Jard. Buitenzorg, VI, 238.

Malacca; Maingay (Kew Distrib.) No. 210. Penang: Curtis, Nos. 167, 266, 1397. Perak: King's Collector, Nos. 3525, 8170. DISTRIB. Borneo: Bangka, Sumatra.

Mr. Curtis notes on the Penang specimens of this, that the bark of the tree is smooth and of a grey colour, whereas the back of its close ally *H. intermedia* is fissured like that of *Shorea parviflora.* The species of *Hopea* with numerous indistinct nerves, (Sect. *Dryobalanoides*) are not easy to distinguish from each other in the Herbarium. *H. Mengarawan*, Miq., a species published two years earlier than this (*i. e.*, in 1860), comes very near this, and the two may possibly prove to be identical, in which case Miquel's name must be adopted. *Hopea cernua*, Teysm. and Binn. was described by its authors from a plant originally obtained from Sumatra, but cultivated in the Buitenzorg Garden. It differs from *H. Mengarawan* and from *H. micrantha* in having larger leaves with more prominent nerves. Its authors were doubtful as to its being really distinct from *H. Mengarawan*, and I think these doubts were well founded. Under the species named *H. Dryobalanoides* by Miquel (l. c) there are, Dr. Burck asserts, two plants. One of these collected at Soengiepagoe in Sumatra, is, he says, simply *H. Mengarawan*, Miq., and it is the fruit of this which Miquel describes under his *H. Dryobalanoides.* The other specimen from Priaman in Sumatra is different, and it is to it that Dr. Burck (Ann. Bot. Jard. Buitenzorg VI., 241) desires to restrict the name *H. Dryobalanoides*, Miq. There is in the Calcutta Herbarium an authentic specimen of the very gathering of the Soengie-pagoe plant on which Miquel worked, and I should refer it to *H. micrantha* Hook. fil.

Petalandra micrantha, Harssk. has been reduced by the authors of the Genera Plantarum (Vol. I. p. 193) to *Hopea*. It is however a different plant from this, and belongs to Miquel's section *Eu-hopea*, which is characterised by the nerves being prominent. By Dr. Burck, *Petalandra* is reduced to *Doona*.

4. HOPEA INTERMEDIA, King n. sp. A tree 60 to 80 feet high: young branches rather dark-coloured, minutely lenticellate, puberulous. *Leaves* coriaceous, ovate-lanceolate, caudate-acuminate, the base cuneate, both surfaces glabrous; main nerves numerous, faint; length 2·5 to 3 in., breadth 1 to 1·35 in.; petiole ·35 to ·6 in. slender, puberulous but finally glabrous. *Panicles* as in *H. Mengarawan*, the flowers pedicellate. *Sepals* sub-equal; the two outer ovate, acuminate; the three inner broader and more obtuse, all resinous outside, glabrous and smooth inside. *Petals* twice as long as the sepals, narrowly oblong, obtuse, falcate, densely sericeous externally, glabrous within. *Stamens* 12; the filaments dilated, shorter than the anthers; the anthers short, crowned by a straight awn from the connective longer than the stamen. *Ovary* hour-glass shaped; style short, stigma small. *Ripe fruit* ovoid, apiculate, ·2 in. long, pale, striate; the two outer sepals accrescent, narrowly oblong-obtuse, narrowed to the base, reticulate, obscurely 5- to 7-nerved, 1·25 to 1·5 in. long and ·25 in. broad; the inner three sepals not accrescent, not longer than the fruit, and closely embracing it.

Penang: Curtis, No. 425 and 1398. Perak: King's Collector, No. 3709.

This species is no doubt near to *H. micrantha*, Hook. fil., but, according to Mr. Curtis, it is distinguishable from that, while growing, by its bark, this tree having a fissured bark like that of *Shorea parvifolia*, Dyer, while the bark of *H. micrantha* is smooth and grey. The petals of this are also more sericeous than those of *H. micrantha*, the filaments are shorter than the anthers (not longer, as in *H. micrantha*), the leaves are more glabrous, the petioles longer and more slender and more glabrous, and the fruit and accrescent sepals are smaller than in *H. micrantha*. I have therefore ventured, after much hesitation, to name this as a species, and from its relationship to *H. micrantha* and *H. Mengarawan*, I have called it *H. intermedia*. Its vernacular name in Penang is *Jankang*. It has been suggested that this plant should be referred to *H. Dryobalanoides*, Miq.—a course which I would have adopted with great pleasure had it been clear what *H. Dryobalanoides* really is.

But, as I have stated in a note under *H. micrantha*, *H. Dryobalanoides* appears to be a composite species; moreover, its author nowhere describes its flowers. For these reasons I think it ought to be suppressed as a species.

7. RETINODENDRON, Korthals.

Resinous trees, with the leaves, inflorescence, and flowers of *Vatica*. *Ripe fruit* globular, crowned by the persistent style, 1-celled, 1-seeded, the pericarp coriaceous, indehiscent. *Calyx* of ripe fruit slightly accrescent, the pieces oblong, nearly equal, and quite free from, and usually shorter than, the fruit (longer in. *R. Kunstleri*). *Isauxis* (sub-genus of *Vateria*) W and A. DISTRIB. Malaya and British India. Species about 10.

Isauxis was established by Wight and Arnot as a sub-genus of *Vateria*, Linn. to receive the three species *Vateria lanceæfolia*, Roxb., *V. Roxburghiana*, Wight and *V. Ceylonica*, Wight (*Stemoporus Wightii*, Thw.) and its characters were, "Segments of the calyx ovate, acute, enlarging in fruit; petals falcate and about three times the length of the calyx: *stamens* 15 with oblong anther cells; *style* short; *stigma* clavate, 3–6 toothed: *panicles* axillary, shorter than the leaves." The other section of *Vateria* suggested by Wight was *Eu-Vateria* (the *Vateria* of Linnæus and of which *V. indica*, L. is the type) and of this the characters are, "*Calyx-segments* obtuse, scarcely enlarging in fruit: *petals* oval, scarcely longer than the calyx: *stamens* 40 or 50 with linear anther-cells: *style* elongated: *stigma* acute; *panicle* large and terminal. Korthals, evidently overlooking Wight's Illustrations, published (Verh. Nat. Gesch. Ned. Ind. p. 56) his genus *Retinodendron* to cover one of the very plants (*viz.*, *Vateria lanceæfolia*, Roxb.) for which Wight and Arnot founded the sub-genus *Isauxis*; and to this *Retinodendron* Korthals added his own Malayan species *R. Rassak* and *R. pauciflorum*. Although *Isauxis* may have the priority as a sub-genus (Wight's Illustrations were published in 1840, and Korthals' book, just quoted, bears the date 1839—1842), *Retinodendron* takes precedence as a *genus*. The flowers of *Retinodendron* are exactly those of all the species of *Vatica* (except the anomalous *V. scaphula*, Roxb.) inasmuch as the segments of the calyx are slightly imbricate when the bud is very young, becoming valvate as the bud advances in age; the petals are much longer than broad, their apices are not inflexed in æstivation, and they are not spreading when expanded. The fruit itself is also practically that of *Vatica*; but the fruiting-calyx is different, for its lobes are invariably free from the beginning, they are pretty nearly equal to each other, but (although slightly accrescent) they are in most cases *shorter* than the fruit. As regards its calyx, *Retinodendron* is closely allied to *Vateria*, but it differs from *Vateria* in its flowers; for in *Vateria* the stamens are numerous (40 to 50), the petals are scarcely longer than the segments of the calyx and are spreading; moreover the inflorescence is longer in *Vateria* than in *Retinodendron*, and it is terminal. In short, *Retinodendron* has the flowers of *Vatica* and the fruit of *Vateria*. Dr. Burck forms *Retinodendron* and *Isauxis* into sections of the genus *Vatica*, giving however characters to the section *Isauxis* which form no part of Wight's original characters of it as a sub-section of *Vateria*. In Dr. Burck's section *Isauxis*, "the calyx-lobes are all accrescent, sub-equal to the fruit, or much longer."

Fruiting-calyx shorter than the fruit.
  Leaves 3·5 to 6 in. long: fruit ·4 in. in diam. 1. *R. pallidum.*
  Leaves 7 to 10 in. long: fruit ·65 in. in diam. 2. *R. Scortechinii.*
Fruiting-calyx longer than the fruit ... 3. *R. Kunstleri.*

1. RETINODENDRON PALLIDIUM, King. A small tree (fide Dyer): young branches slender, deciduously puberulous, their bark pale. *Leaves* coriaceous, oblong-lanceolate to narrowly elliptic, acuminate; the edges entire, recurved when dry; the base acute: both surfaces glabrous, the upper shining; main nerves 9 to 10 pairs, curving, oblique; length 3·5 to 6 in., breadth 1·2 to 1·8 in., petiole ·4 to ·5 in. *Panicles* axillary, rarely extra-axillary, puberulous, 1 to 3 in. long. *Flowers* ·45 in. long; *Calyx-segments* ovate-lanceolate, scurfy-pubescent. *Petals* oblong, lanceolate, sub-acute, stellate-pubescent externally. *Anthers* broadly ovate, with a short blunt apiculus. *Ovary* puberulous; stigma capitate, lobed. *Fruit* globular, about ·4 in. in diam., glabrous, shining, very minutely and sparsely lepidote, partially covered in the lower half by the slightly unequal, spreading or sub-reflexed, narrowly-oblong, membranous, 3-nerved, reticulate calyx-lobes. *Vatica pallida*, Dyer in Hook. fil. Fl. Br. Ind. I, 302.

Penang: Maingay, on Government Hill, at an elevation of about 800 feet; Curtis, No. 117; King, Kunstler.

This is known only from Penang. It is evidently a rare tree. Its fruit somewhat resembles (except in size) that of *V. lanceæfolia*, Blume.

2. RETINODENDRON SCORTECHINII, King, n. sp. A tall tree: young branches rather stout, densely furfuraceous-pubescent. *Leaves* coriaceous, oblong, tapering to the sub-acute apex; the base slightly narrowed, rounded: both surfaces glabrous: main nerves 14 to 18 pairs, spreading, curving, prominent on the lower, depressed on the upper, surface when dry, the transverse venation bold: length 7 to 10 in., breadth 2·6 to 3·2 in, petiole ·6 to ·75 in. *Panicles* crowded towards the apices of the branches, mostly axillary, 2 to 2·5 in. long, the rachises brownish flocculent stellate-tomentose, as is the calyx externally. *Flowers* ·6 in. long. *Calyx-lobes* ovate. *Petals* thick, oblong, blunt, puberulous externally, glabrous within. *Stamens* elliptic, apiculate. *Ovary* minutely tomentose; stigma clavate. *Ripe fruit* sub-globular, sub-rugose, vertically grooved, minutely rufous-scurfy, about 65 in. in diam., laxly embraced in the lower half by the broadly ovate, membranous, many-nerved, reticulate, sub-equal calyx-lobes.

Perak: Scortechini, Nos. 1940 and 1942.

The calyx-lobes are nearly equal in size, quite free from the fruit, much shorter, and they embrace only its lower half. This species is allied to *Retinodendron Rassak*, Korth. (Nat. Gesch. Ned. Ind. 56, t. 8,) but has broader leaves and much more condensed panicles than that species.

3. RETINODENDRON KUNSTLERI, King n. sp. A tree, 20 to 50 feet high, sometimes a shrub: young branches slender, deciduously stellate-puberulous. *Leaves* thinly coriaceous, elliptic-oblong to oblong-lanceolate, sometimes slightly obovate, sub-acute or shortly and bluntly acuminate; the base cuneate, rarely rounded: upper surface glabrous, the midrib and nerves pubescent; the lower quite glabrous; main nerves 7 to 9 pairs, ascending, slightly prominent beneath: length 2·25 to 4·5 in., breadth 1·25 to 1·75 in., petiole ·25 to ·4 in. *Racemes* axillary, 1 to 1·5 in. long, sparsely scaly. *Flowers* ·4 in. long. *Calyx-lobes* ovate-lanceolate, puberulous. *Petals* oblong-elliptic, oblique, obtuse, puberulous outside. *Anthers* slightly and sharply apiculate. *Ovary* puberulous, stigma capitate. *Ripe fruit* globular, with a long curved apical beak, glabrous, about ·25 in. in diam. *Calyx-lobes* all accrescent, sub-equal, oblong, tapering slightly to the sub-obtuse apex, the base slightly auricled, thickly membranous, glabrous, 3-nerved, the longest about 1·3 in. long, and ·35 in. broad, loosely surrounding, and longer than, the fruit.

Perak; Scortechini, Wray, King's Collector; very common at low elevations.

In this species all the five calyx-lobes are accrescent and of nearly equal size. They are quite free from the ripe fruit, round which they form a loose semi-inflated investiture. Its nearest ally is *Vatica bancana*, Scheffer, (*Retinodendron bancanum*).

8. ISOPTERA, Scheffer.

A tall resinous tree. *Leaves* coriaceous, entire, feather-veined. *Flowers* in axillary or terminal panicles. *Calyx-tube* very short, the segments ovate-rotund, imbricate. *Stamens* 30 to 35, the anthers ovate, the cells divergent at the base, acute, the valves equal, the connective produced into an apical bristle-like appendage. *Ovary* 3-celled, the loculi bi-ovulate; the style short, terete, 3-angled at the apex. *Fruit* indehiscent, 1-seeded, the pericarp coriaceous. *Fruiting-calyx* an open cup not embracing the fruit; its lobes all slightly enlarged, spreading (not winged); the outer 3 rotund, broader than the 2 narrower inner lobes.

One species—Malayan.

1. ISOPTERA BORNEENSIS, Scheff. MSS. ex Burck in Ann. Bot. Jard. Buitenzorg VI, 222. A large tree: young branches slender, dark-coloured, sparsely lenticellate, glabrescent. *Leaves* coriaceous, oblong, sub-acute, slightly narrowed to the rounded base: upper surface glabrous except the puberulous midrib; the lower pale, glabrous; main

nerves 8 or 9 pairs, oblique, slightly curving, prominent beneath; length 4 to 5 in., breadth 1·75 to 2 in., petiole ·5 in. *Panicles* 4 to 6 in. long, stellate-pubescent; bracteoles caducous. *Flowers* shortly stalked. *Calyx-segments* minutely tomentose. *Petals* ·5 in. long, pale tomentose. *Stamens* 30 to 36, in 3 series, the filaments dilated at the base: anthers with equal valves. *Ovary* sericeous, style glabrous. *Ripe fruit* sub-globose, acuminate, pale tomentose, about ·25 in. in diam.; fruiting-calyx forming a cup with a concave short tube embracing the fruit, the segments spreading, re-curved, the 3 outer ·65 in. in length and breadth, the 2 inner smaller. Heim, "Recherches sur les Dipterocarpacées," p. 51.

Pahang: Ridley, No. 2626. DISTRIB. Bangka, Borneo.

Leaf-specimens of what appear to be this tree were collected by Mr. Wray (Herb. No. 3426) in Upper Perak.

9. BALANOCARPUS, Beddome.

Glabrous or puberulous, rarely scabrid, resinous trees, with inconspicuous fugaceous stipules. *Leaves* entire, coriaceous or membranous, penni-nerved. *Flowers* secund, sessile or shortly pedicelled. *Sepals* distinct or united at the base, imbricated, two quite external to the others; in fruit sub-equal, only slightly enlarged, woody, thickened, and forming a 5-lobed cup round the base of (but rarely enveloping) the fruit, not adnate to it and never expanding into wings. *Petals* elliptic, obliquely acuminate, the apices slightly inflexed in bud or not inflexed at all. *Stamens* 15, attached to the bases of the petals, in 3 rows; or 10 in 2 rows, sub-equal, the filaments much dilated at the base, the connective prolonged into a straight apical awn longer than the ovate anther. *Torus* flat. *Ovary* 3-celled, cells 2-ovuled, ovules collateral. *Style* short. *Stigma* minute, entire. *Fruit* oblong or sub-globose, apiculate; the pericarp ligneous or sub-ligneous. *Seed* solitary, erect; cotyledons fleshy, plano-concave, the larger 2- or 3-lobed, or entire; the radicle prominent. Southern Peninsular India, Malaya. Probably 12 species.

Leaves glabrous, smooth.
  Leaves ovate-lanceolate or ovate, caudate-acuminate.
    Stamens 15
      Fruit entirely enveloped in the slightly enlarged calyx ... ... 1. *B. Curtisii.*
      Only the lower part of the fruit enveloped by the calyx ... ... 2. *B. penangianus.*
    Stamens 10 ... ... 3. *B. anomalus.*

Leaves narrowly oblong, gradually narrowed to the acute apex.
Fruit 1·75 to 2·25 in. long: stamens 10 ... 4. *B. maximus.*
Fruit 1·5 in. long; leaves 4 to 6 in. long, with 9 or 10 pairs of bold parallel nerves ... ... 5. *B. Heimii.*
Fruit ·6 in. long: leaves 2·25 to 2·75 in. long, with 7 or 8 pairs of slightly prominent nerves ... ... 6. *B. Wrayi.*
Leaves stellate-pubescent, scabrid ... ... 7. *B. Hemsleyanus.*

1. BALANOCARPUS CURTISII, King. A tree 20 to 30 feet high: young branches slender, the bark dark-coloured, puberulous. *Leaves* membranous, ovate-lanceolate, bluntly caudate-acuminate, the base slightly cuneate: both surfaces glabrous, dull; main nerves 8 to 10 pairs, spreading, faint and scarcely more prominent than the secondary nerves; length 2 to 2·5 in., breadth ·75 to 1 in., petiole ·1 to ·15 in. *Panicles* axillary and terminal, shorter than the leaves, glabrescent, lax, each with a few 3- to 5-flowered spreading branches. *Flowers* secund, shortly pedicelled, ·15 in. long. *Sepals* distinct, sub-equal, thick, rotund-ovate, very obtuse, puberulous outside, glabrous inside, the edges slightly ciliate. *Petals* elliptic, obliquely shortly and bluntly acuminate, glabrescent inside, partly puberulous and partly glabrous outside. *Stamens* 15, in 3 rows, sub-equal; the filaments shorter than the anthers, dilated: anthers broadly elliptic, truncate, the connective produced into an apical awn longer than the stamen. *Ovary* cylindric, truncate, glabrous, the style short and stigma minute. *Fruit* smooth, globular, apiculate, crowned by the sub-sessile discoid stigma, enveloped by, but not adherent to, the slightly thickened sepals, ·25 to ·3 in. in diam. (calyx included).

Penang: Curtis, No. 1406. Perak: King's Collector, Nos. 3171, 3294, 6543; Wray, No. 2860.

2. BALANOCARPUS PENANGIANUS, King, n. sp. A tree 40 to 50 feet high: young branches slender, dark-coloured, lenticellate, slightly puberulous at the very tips. *Leaves* coriaceous, ovate-lanceolate or ovate-acuminate, often caudate-acuminate, the base slightly cuneate or almost rounded, the edges slightly undulate, both surfaces glabrous: main nerves 7 to 8 pairs, spreading and curving upwards, not prominent on either surface; length 1·75 to 4 in., breadth ·8 to 1·6 in., petiole ·25 to ·4 in. *Panicles* axillary and terminal, hoary-pubescent, many-flowered; the flowers secund, 7 to 9 on each lateral branchlet, pedicelled, ·15 to ·2 in. long. *Sepals* sub-equal, broadly ovate, sub-acute, yellowish-pulverulent, tomentose externally, glabrous internally. *Petals* oblong, obtuse, twisted and with the apices reflexed in æstivation, spreading

when expanded, minutely yellowish-pulverulent, tomentose outside, glabrous inside. *Stamens* 15, sub-equal: apical awn curved, longer than the anther. *Ovary* ovoid, narrowing upwards into the style; stigma minute. *Fruit* ovoid, very slightly apiculate, striate, pale pubescent, about ·6 in. long and ·3 in. in diam., the persistent calyx covering the lower third of the fruit, sub-glabrous, thickened and concave at the base; the teeth deltoid, spreading. *Richetia penangiana*, Heim in Bull. Soc. Linn. Paris, 1891, p. 980.

Penang: on Government Hill, at an elevation of about 1,000 feet, Curtis, Nos. 1429 and 1393; Hullett, No. 188; King's Collector, No. 1534. Perak: King's Collector, Nos. 3333, 3707.

The leaves of this species, although larger, resemble those of *B. Curtisii*: but the fruits of the two are quite different. One of Mr. Curtis' specimens, No. 429 (communicated from Kew), forms the type of a new genus called *Richetia*, which M. Heim has founded (l. c. p., 975, also in his "Recherches sur les Dipterocarpacées" p. 50), without having seen its flowers. I have retained for this M. Heim's specific name, while referring it to Beddome's older genus. The vernacular name of the species is *Dammar Etam*.

3. BALANOCARPUS ANOMALUS, King. A tree: young branches slender, dark-coloured, minutely lenticellate, the tips puberulous. *Leaves* coriaceous, ovate, acuminate; the base broad, sub-cuneate; both surfaces glabrous; main nerves 6 or 7 pairs, ascending, curving, not prominent: length 2·25 to 2·5 in., breadth 1 to 1·3 in., petiole ·6 to ·7 in. *Panicles* numerous, axillary and terminal, longer than the leaves, pubescent, their lateral branchlets bearing 6 to 8 sub-secund flowers. *Flowers* shortly pedicelled, ·15 in. long. *Sepals* broadly ovate, connate at the base, obtuse, minutely tomentose outside, glabrous inside. *Petals* elliptic, blunt, yellowish adpressed-sericeous outside, glabrous inside, only about twice as long as the sepals, spreading and reflexed so as to expose the stamens and pistil. *Stamens* 10, in two rows; the filaments longer than the anthers, dilated; anther short, ovate, its connective produced into an apical awn as long as itself. *Ovary* ovoid, striate, pubescent, style short and thick, stigma small.

Kedah: Curtis, No. 1654.

Mr. Curtis is as yet the only collector of this, and his specimens have no fruit. I refer it to this genus, although its flowers differ from those of the other species known to me, in having petals only about twice as long as the sepals, spreading and reflexed so that the andro-gynœcium is quite exposed; and in having only 10 stamens In other respects the specimens agree with *Balanocarpus*. Its vernacular name in Kedah is *Malaut*.

4. BALANOCARPUS MAXIMUS, King, n. sp. A tree 60 to 80 feet high: all parts except the inflorescence glabrous: young branches rather stout; the bark, loose, papery, lenticellate, pale. *Leaves* thinly coriaceous, oblong to elliptic-oblong, sub-acute, slightly narrowed to the rounded base; main nerves 7 to 9 pairs, slightly prominent beneath, the transverse veins slightly prominent when dry: length 5 to 7 in., breadth 2 to 2·5 in., petiole ·5 to ·6 in. *Panicles* axillary or terminal, about half as long as the leaves, few-flowered, minutely tomentose. *Flowers* sub-sessile, ·6 or ·7 in. long. *Sepals* broadly ovate, the outer two tomentose, the inner three more or less glabrous externally, all glabrous internally, the inner two with ciliate margins. *Petals* much longer than the sepals, narrowly oblong, the apex erose, expanded and concave at the base, ad-pressed-pubescent outside and towards the apex inside, otherwise glabrous. *Stamens* 10, in two rows; anthers with a deflexed terminal appendage from the connective. *Ovary* elongate, narrowly conical, sericeous. *Style* rather short, glabrous; stigma small. *Ripe fruit* cylindrical, tapering to each end but most to the apiculate apex; pericarp woody, striate, sub-glabrous, pale-brown when dry: 1·75 to 2·25 in. long, and ·6 or ·7 in. in diam. *Persistent sepals* fibrous, forming a toothed cup about ·5 in. deep, embracing the base of the fruit.

Perak: King's Collector, Nos. 7987 and 8006.

The flowers of this fine species do not exactly answer to Beddome's diagnosis of the genus *Balanocarpus*, inasmuch as they have 10 instead of 15 stamens, and neither of the cotyledons is lobed. In other respects the flowers and fruit agree perfectly.

5. BALANOCARPUS HEIMII, King n. sp. A tree 50 to 60 feet high: young branches rather slender, the bark dark-coloured, puberulous or glabrescent. *Leaves* coriaceous, narrowly oblong, tapering to the acuminate apex, and slightly narrowed to the rounded base; upper surface glabrous, shining, the midrib minutely pubescent: lower surface glabrescent except the pubescent midrib and 9 or 10 pairs of ascending, bold, slightly-curving nerves: length 4 to 6 in., breadth 1 to 1·75 in.; petiole ·3 or ·4 in., with minute black tomentum. *Flowers* unknown. *Ripe carpels* cylindric, tapering to the apex, slightly narrowed to the base, 1·5 in. long and ·5 in. in diam.; the pericarp woody, sub-glabrous, sub-striate, dark-coloured when dry. *Persistent sepals* sub-equal, puberulous, thickened, forming a 5-lobed cup ·6 in. deep which embraces the base of the fruit. *Pierrea Penangiana*, Heim, MSS.

Penang: Curtis No. 273 (leaves only). Perak: King's Collector, No. 3718.

This tree, of which as yet only fruiting specimens have been found, so closely resembles the other Malayan species of *Balanocarpus* described here, that I refer it without any hesitation to this genus. M. Curtis' leaf specimens of this have, I understand, received from M. Heim the MSS. name, *Pierrea penangiana*. The genus *Pierrea* has been founded by M. Heim (Bull. Soc. Linn. Paris, 1891, p. 958, and "Recherches sur les Dipterocarpacées", p. 78) on specimens of which the author has not (as he admits) had the advantage of seeing the flowers. The vernacular name of this tree in Penang is *Chengah*, and its timber is, according to Mr. Curtis, very valuable. In the State of Perak, on the mainland almost opposite Penang, another species (*B. Wrayi*) receives a similar vernacular name.

6. BALANOCARPUS WRAYI, King n. sp. A tree: young branches slender, dark-coloured, glabrous. *Leaves* coriaceous, narrowly oblong, gradually tapering from the middle to the acute apex; the base subcuneate or rounded, slightly unequal-sided: both surfaces glabrous; main nerves 7 or 8 pairs, curved, oblique, slightly prominent beneath: length 2·25 to 2·75 in., breadth ·75 in.; petiole ·25 in., transversely wrinkled. *Panicles* axillary and terminal, nearly as long as the leaves. *Flowers* unknown. *Fruit* ovoid, much apiculate, glabrous, ·6 in. long, covered in its lower two-thirds by the persistent sub-accrescent glabrous calyx; outer two sepals smaller than the others, elliptic, obtuse, the inner three rotund, all thickened and concave.

Perak: Wray, No. 813.

Collected only once and without flowers. According to Mr. Wray the timber of this tree is valuable, and its vernacular name is *Chingi*, or *Chingal*. I refer this (in spite of the absence of flowers) to *Balanocarpus*, the other species of which it so closely resembles.

7. BALANOCARPUS HEMSLEYANUS, King, n. sp. A tree 50 to 100 feet high: young branches rather stout, rough, minutely lenticellate, puberulous. *Leaves* coriaceous, elliptic-oblong, sometimes slightly obovate, shortly and abruptly acuminate, slightly narrowed to the rounded or sub-emarginate base: upper surface glabrous except the minutely tomentose midrib; the lower scabrid from minute rigid stellately hairy tubercles which are most abundant on the stout midrib and nerves: main nerves 18 to 20 pairs, oblique, parallel, very prominent on the lower, obsolete on the upper, surface; length 7 to 12 in., breadth 3·25 to 5 in.; petiole ·6 to ·9 in. scabrid, pubescent. *Panicles* axillary or terminal, 3 to 7 in. long, scurfy stellate-pubescent; flowers rather crowded on the lateral branchlets, ·5 in. long. *Sepals* sub-equal, broadly ovate, acute, yellowish-tomentose externally, glabrous internally. *Petals* twice as long as the sepals, or longer, elliptic, oblique, obtuse, glabrous except a broad adpressed-sericeous band externally. *Stamens* 15, in three rows: the filaments dilated, unequal, longer than

the shortly ovate anthers; apical connectival appendage deflexed, curved, longer than the anther. *Ovary* elongated-conic, tomentose, tapering into the sparsely puberulous style; stigma small. *Ripe fruit* narrowly ovoid, apiculate, pale brownish-tomentose, 1·25 to 1·5 in. long. and ·75 to 1 in. in diam. *Persistent sepals* nearly equal, their bases thickened, woody, pubescent, and concave, forming an irregularly 5-toothed cup which embraces the lower half of the fruit. *Shorea Hemsleyana*, King MSS. in Herb. Calc.

Penang: Curtis No. 2512. Perak: King's Collector, Nos. 5431, 6670, and 7562. Scortechini No. 1653.

This is an altogether anomalous species. It has leaves like several of the scabrid species of *Shorea*, such as *S. eximia* and *S. leprosula*. Its flowers are also more like those of *Shorea* than *Balanocarpus;* but its fruit is essentially that of the latter genus, in which, not without hesitation, I include it.

10. PACHYNOCARPUS, Hook. fil.

Resinous trees with the leaves and flowers of *Vatica*, but with sometimes only ten stamens. *Fruit* ovoid-globose, umbonate at the apex, 1-celled, 1-seeded, the pericarp densely coriaceous, splitting vertically. *Calyx* with five equal segments, at first almost free from the fruit, but the tube gradually accrescent, much thickened and adnate to the fruit, and finally embracing the whole of it except the apex. *Seed* pendulous, testa thin and adherent to the endocarp, cotyledons very thick and fleshy.

Leaves elliptic to oblong-elliptic, sub-acute or
shortly and obtusely acuminate... ... 1. *P. Wallichii.*
Leaves broadly-elliptic or obovate-elliptic, the
apex very blunt ... ... 2. *P. Stapfianus.*

Dr. Burck (in Ann. Jard. Bot. Buitenzorg) expands the definition of the genus *Vatica* so as to include not only the closely allied *Synaptea*, but also the genera *Isauxis* W. A , *Retinodendron*, Korth., and *Pachynocarpus* Hook fil. To the union of *Synaptea* with *Vatica* I see no objection; for the whole difference between the two (as I have stated in a note under *Vatica*) consists in perfect freedom of the fruit in *Vatica* from the enlarged calyx, whereas in *Synaptea* there is a slight adhesion to the calyx at the very base. But for the inclusion of *Pachynocarpus*, I see no sufficient justification; for in this genus the calyx does not expand into membranous wings, but forms a dense fibro-cartilaginous cover for the fruit, which it tightly embraces, and to which it is quite adnate. As regards *Isauxis* and *Retinodendron*, they appear to me to be undistinguishable from each other by any but trivial marks, but they differ sufficiently in calyx from *Vatica* to be treated as a genus under the older name *Retinodendron*.

1. PACHYNOCARPUS WALLICHII, King. A tree 40 to 70 feet high: young branches deciduously scurfy-puberulous, their bark pale-brown, sparsely lenticellate. *Leaves* coriaceous, elliptic to oblong-elliptic,

sub-acute, or shortly and obtusely acuminate, the base cuneate; both surfaces glabrous, the lower pale and prominently reticulate when dry: main nerves 6 to 9 pairs, slightly prominent beneath, ascending; length 4·5 to 8 in., breadth 1·5 to 3 in., petiole; ·4 to ·6 in. *Panicles* crowded near the apices of the branches, many-flowered, 2 to 4 in. long. *Calyx-lobes* deltoid, minutely velvety outside. *Petals* linear-oblong, obtuse, puberulous externally. *Stamens* broadly ovoid, minutely but obtusely apiculate. *Ovary* puberulous: stigma sub-capitate, lobed. *Ripe fruit* ovoid-globose, about ·75 in. in diam., closely embraced by the slightly shorter, much thickened, persistent, fibrous or woody, rugose, enlarged calyx-lobes. *V. Wallichii* Dyer in Journ. Bot. 1878 p. 154. *Vatica ruminata*, Burck in Ann. Jard. Bot Buitenzorg, VI, 227 t. 29, fig. 4.

Penang: Wallich, Cat. No. 9018; Curtis Nos. 1161, 1218, 1391. Malacca: Maingay No. 201. Trang, King's Collector. Johore, Hullett and King. Perak: common at low elevations, King's Collector, Scortechini. DISTRIB., Bangka.

In the young stages of the fruit of this species the calyx is quite small and embraces only the very base of it, much as in *Isauxis;* but as the fruit expands the calyx grows, so that when ripe the fruit is, with the exception of its apex, closely embraced by the much thickened, lignified, obscurely toothed calyx-tube. This offers, therefore, a transition between *Isauxis* and *Pachynocarpus.* And, indeed, it is to the former section that Dyer refers it (Journ. Bot., l. c.), and to which Burck refers his *D. ruminata*, a species which authentic specimens shew to be identical with this. Dr. Burck's species, *Vatica verrucosa* (Ann. Jard. Bot. Buitenzorg) appears also to come very near to this.

2. PACHYNOCARPUS STAPFIANUS, King, n. sp. A tree 80 to 100 feet high: young branches rather stout, scaly-pubescent at first, ultimately glabrous. *Leaves* coriaceous, broadly elliptic or obovate-elliptic, the apex broadly rounded, slightly narrowed to the rounded or sub-cuneate base: upper surface glabrous, shining, the lower paler, minutely and sparsely scurfy-puberulous on the midrib and nerves; main nerves 10 to 13 pairs, oblique, prominent on the lower, depressed on the upper, surface; length 5 to 8 in., breadth 2·75 to 4·5 in., petiole ·65 to 1 in. *Flowers* unknown. *Ripe fruit* almost solitary, 2·5 to 3 in. long, on a woody raceme, globular, slightly apiculate, 1·25 in diam., closely invested by the gamosepalous, 5-toothed, thickened, woody, rugose, glaberulous calyx.

Perak: King's Collector, Nos. 5932 and 6132,

This very distinct species was first recognised as a *Pachynocarpus* by Dr. O. Stapf, of the Kew Herbarium, after whom I have named it. Its flowers are as yet unknown; but it is readily identified by its leaves.

11. Ancistrocladus, Wall.

Smooth climbing shrubs with short supra-axillary, often arrested and circinately-hooked, branches. *Leaves* usually in terminal tufts, coriaceous, entire, reticulately feather-veined; exstipulate *Flowers* usually small, very caducous, in terminal or lateral panicles. *Calyx-tube* at first short, adnate to the base of the ovary, its lobes imbricate, finally turbinate and adnate to the fruit, with the lobes unequally enlarged, spreading and membranous. *Stamens* 5 or 10, subperigynous. *Ovary* 1-celled, inferior; style sub-globose, persistent; *Stigmas* 3, erect, compressed, truncate, deciduous. Ovule solitary, erect or laterally affixed. *Seed* sub-globose, testa prolonged into the ruminations of the copious fleshy albumen; embryo short, straight; cotyledons short, divergent.—Distrib. Except *A. guineensis* in W. Tropical Africa, confined to Tropical Asia and the Indian Archipelago. Species about 10.

I follow the authors of the Genera Plantarum and the Flora of British India in including *Ancistrocladus* in *Dipterocarpeæ*. I venture, however, to think that it would be better to keep it as the type of a distinct Natural Order as MM. Planchon and De Candolle have done: for its characters do not fit well into the diagnosis of any other Order

1. Ancistrocladus extensus, Wall. Cat. 1052. *Leaves* obovate or obovate-oblong, blunt or sub-acute, much narrowed at the base; panicles dichotomous, about half as long as the leaves: fruit smooth or slightly 5-ridged; accrescent calyx-lobes oblanceolate, obtuse. Planch. in Ann. Sc. Nat. Ser. 3, XIII, 318. DC. Prodr. XVI, 2, 602; Dyer in Hook. fil. Fl. Br. Ind. I, 299. *Ancistrolobus* sp. Griff. Notul. IV, 568, t. 605. fig. 2.

Andaman Islands. Distrib. Burmah.

Var. *pinangianus;* leaves sometimes oblanceolate-oblong, acute or sub-acuminate: panicles slender, lax, about as long as the leaves. *Ancistrocladus pinangianus*, Wall. Cat. 1054 Planchon in Ann. Sc. Nat. Ser. 3. XIII, 318; A. DC. Prodr. XVI. 2, 603; Dyer in Hook. fil. Fl. Br. Ind. I, 300.

Penang: Porter. Malacca: Maingay. (Kew Distrib.) No. 200. Singapore and Perak: King's Collectors. Distrib. Bangka, Sumatra, Burmah.

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On some Newly-recorded Corals from the Indian Seas, by A. ALCOCK, M.B., C.M.Z.S., *Officiating Superintendent of the Indian Museum.*

Plate V.

[Received May 22nd, Read June 7th].

As so little has been written about the coral fauna of the seas within the limits of the Indian peninsulas, the following account of the corals dredged in recent years by the "Investigator," and by the late Professor Wood-Mason, may be of interest.

No reference is made in this paper to the true reef-forming corals.

FAMILY TURBINOLIDÆ.

FLABELLUM, Lesson.

1. *Flabellum stokesi*, Edw. & Haime, Moseley.

Flabellum stokesi, *Flabellum oweni*, *Flabellum aculeatum*, *Flabellum spinosum*, all of Milne-Edwards and Haime, Hist. Nat. des Coralliaires, vol. ii. pp. 96, 87 and 88.

Flabellum variabile, Semper, Z. Wiss. Zool., vol. xxii, 1872, p. 245.

Flabellum stokesi, Moseley, Challenger Deep-sea Madreporaria, p. 172.

This species, not hitherto recorded in the Indian Fauna, is common from Ceylon, along the east coast of India, to the Andaman Islands, at depths of from 20 to 30 fathoms. The numerous specimens dredged by Professor Wood-Mason in the Andaman Sea, and by the "Investigator" elsewhere, fully bear out Professor Semper's views as to the identity of all the four species of MM. Milne-Edwards and Haime above-cited. Undoubtedly Professor Semper's name for the species is very appropriate; but, as Professor Moseley says, it is necessary to retain one of the original names, and he has selected the specific designation *stokesi* as being least likely to lead to error.

ACANTHOCYATHUS, Edw. & Haime.

2. *Acanthocyathus grayi*, Edw. & Haime,

Acanthocyathus grayi, Milne-Edwards and Haime, Hist. Nat. des Corall., vol. ii. p. 22.

This species was described by MM. Milne-Edwards and Haime as of "patrie inconnue:" I have little hesitation in identifying with it a single specimen dredged by Professor Wood-Mason in the Andaman Sea.

PARACYATHUS, Edw. & Haime.

3. *Paracyathus indicus*, Duncan, var. nov. *gracilis.* Vide Duncan, Journ. Linn. Soc., Zool., vol xxi. 1889, p. 3.

The type of this species, which was brought by Dr. Anderson from Mergui, is in the Indian Museum, and I have now to record a distinct variety from the Bombay coast. This variety is characterized by its greater delicacy, and by the form of the corallum, which is subturbinate with a long slender pedicle.

4. *Paracyathus cavatus*, n. sp. Pl. V figs. 1. 1a., very near *Paracyathus crassus*, Edw. & Haime.

Corallum with a broad encrusting base, gently expanding into a low, slightly curved, sub-circular calice.

Costæ distinct from the basal encrustment, finely and distantly granular, every alternate one conspicuously salient.

Calice sub-circular, open, deep: the marginal axes in the same plane.

The finely and distantly granular septa are in five incomplete crowded cycles, and do not project far into the calice; those of the first three cycles are exsert. Those of the incomplete fifth cycle are small, and unite with those of the fourth cycle just below the calicular margin, while those of the fourth cycle unite with those of the third deep down in the calyx. The pali are in the form of numerous strong salient and very regular denticulations of the septal margins,—excluding those of the last cycle: those of the primary septa are much the most distinct, not because they are larger but because they are isolated.

The columella is very small, deeply-seated and concave, consisting of numerous minute close-set papillæ.

The tips of the septa are coloured pale madder-brown.

Greatest height of corallum 9 mm., major diameter of calice 11 mm., minor diameter of calice 10 mm., diameter of basal constriction 7 mm.

From the Persian Gulf.

The species is characterized by the very distinct alternately-salient costæ, by the deep hollow calice into which the septa project but little, and by the isolation of the series of strong paliform teeth opposite the septa of the first cycle.

5. *Paracyathus fulvus*, n. sp. Plate V, figs. 2. 2a., near *Paracyathus crassus*, Edw. & H.

Corallum low, with an extensively encrusting base, and a short stout gently curved cylindrical peduncle which expands gradually into a circular slightly drooping calicle.

Costæ indistinct at the base but gradually becoming distinct near the margin of the calicle, where they are broad, finely granular and in all respects uniform.

The circular calice is open and moderately deep, with the marginal axes on the same plane.

The septa, which are in six systems, are exsert, with blunted slightly crenulated edges and distantly granular surfaces. Those of the first cycle are particularly distinct, being larger and stouter than those of any of the other cycles, projecting more into the calicle, and being more exsert beyond the margin. The quaternaries unite with the tertiaries near the columella. The pali have the form of stout granular pinnacles in three crowns, decreasing in size from without inwards, before all the septa but those of the last cycle.

The columella is small circular and slightly concave, and consists of numerous crowded granules.

In the type specimen the height of the corallum is 12·5 mm., the diameter of the calice 10·5 mm., and the diameter of the peduncle 7 mm.

The septa and pali are of a permanent tawny-brown colour.

The specimens in the Museum came from the telegraph cable in the Persian Gulf.

The distinctive characters of this species are the marked predominance of the primary septa, and the definition and regularity of the pali.

6. *Paracyathus porphyreus*, n. sp. Plate V, figs. 3. 3a, near *Paracyathus pulchellus*, Edw. & H.

Corallum with an encrusting base, above which it is suddenly constricted to again gradually expand into a slightly drooping, turbinate calice.

Costæ distinct from the base, equal, finely granular, depressed.

The calice is slightly elliptical, with marginal axes almost on the same plane: it is deep, but its cavity is about two-thirds filled by the septa.

The septa, which are crowded and exsert, are in four complete cycles in the young, with an incomplete fifth cycle in older examples: they have sharp and slightly crenulated edges and coarsely granular surfaces: those of the first two cycles are the most exsert: those of the fourth cycle unite with those of the third deep down in the calice behind the outer crown of pali.

The pali, which are in two crowns, are tall and large, those which stand opposite the tertiary septa being much the largest: the two crowns of pali, as seen from above, form a broad ring within the calice, very distinctly delimited both from the septa and from the columella.

The very deeply seated columella is large and concave, and consists of numerous close-set, blunt pinnacles.

In the type specimen the height of the corallum is 11·5 mm., the major diameter of the calice 10 mm. and the minor diameter 8 mm., and the diameter of the pedicle 5 mm.

The septa, pali and columella are of a dull purple-black colour.

Dredged off the Arrakan Coast by the "Investigator:".

The distinctive characters of this species are (1) the delicacy of the calice wall in comparison with the stoutness of the septa and pali, (2) the large size of the pali and the very distinct definition of the palar zone, and (3) the punched-out appearance of the deep-seated columella.

HETEROCYATHUS, Edw. & Haime.

7. *Heterocyathus æquicostatus*, Edw. & Haime.

Heterocyathus æquicostatus, Milne-Edwards and Haime, Hist. Nat. des Corall., vol. ii, p. 51.

Numerous specimens were dredged by Professor Wood-Mason in the Andaman Sea. Every specimen has the base perforated and tunnelled for the residence of a worm, which no doubt lives as a commensal with the coral zoophyte, as I shall be able to show in the parallel case of *Heteropsammia*.

8. *Heterocyathus philippensis*, Semper.

Heterocyathus philippensis, Semper, Zeitschr. Wiss. Zool., vol. xxii 1872, p. 254, taf. xx. figs 12–14.

Two specimens were dredged by Professor Wood-Mason in the Andaman Sea.

9. *Heterocyathus wood-masoni*, n. sp. Plate V, figs 4. 4a.

The corallum is either low and discoid, or if it is higher it is so faintly and truncately conical that the diameter of the base is not much greater than that of the shallow plane calice.

The costæ, which begin on the flat basal surface near its margin, are equal, regular and very finely granular, and are separated from one another by deep incisions.

The calice is circular and quite flat, except for a central umbilication which marks the columella.

The septa are in four cycles, of which those of the third cycle are by far the smallest, while the primary septa along with the nearest quaternary of the adjoining half-system on each side are the largest. The six large primary septa with their large quaternary on each side thus form a six-rayed star, each ray consisting of three equal segments—namely a primary septum with a quaternary on each side of it.

The septa are hardly exsert, and they resemble the costæ, with which they are continuous, in being finely and uniformly granular.

Pali, in the form of series of very small denticles, stand before the primary and secondary septa, and also before the united margins of the tertiaries and quaternaries of each half-system.

The columella is distinct and consists of contorted granules. Dredged by Professor Wood-Mason in the Andaman Sea. Every specimen, as in the case of *H. æquicostatus* and *H. philippensis*, is perforated and tunnelled in the base by a worm.

The distinctive characters of this species are (1) the circular calicle almost or quite equal to the base in diameter, and not separated from the base by any constriction whatever, (2) the equivalence in size of the primary septa with the quaternaries standing immediately on each side, and (3) the small size of the pali.

DISCOTROCHUS, Edw. & Haime.

10. *Discotrochus investigatoris*, n. sp. Plate V, figs. 5. 5a.

Corallum discoid, thick and coarse. The almost horizontal base culminates in a coarse scar from which very distinct coarsely granular costæ radiate, the costæ being equally distinct throughout their course and all of uniform size

The calice is very shallow.

The septa, which are in four cycles, are slightly exsert, with thick coarsely spinate or dentate edges: those of the first cycle are the most prominent, and those of the third cycle the least so, but the difference in size between any of the cycles is not very marked.

The columella consists of a few papillæ.

Diameter of disk 8 mm., greatest thickness 2 mm.

The single specimen was dredged by the 'Investigator' off the Arrakan Coast, and appears to be a denuded fossil.

Its possible fossil character is supported by the fact that, as Professor Wood-Mason informed me, fossil Crustacea were dredged either at or very near the same place during the same surveying season. The exact spot at which the coral was dredged was off the Islands of Rámree and Cheduba.

In relation to the possible fossil nature of this species I may refer to two papers in the *Records of the Geological Survey of India*, vol. ix. ("On the Mud Volcanoes of Rámri and Cheduba" by F. R. Mallet, F. G. S., p. 188, and "On the Mineral Resources of Rámri, Cheduba, and the adjacent Islands," by the same author, p. 207), to which my attention has been very kindly directed by Mr. T. H. Holland of the Geological Survey.

In these papers there is notice of historical evidence of the recent elevation of the land in this vicinity and along with it of much recent coral.

The rocks of this region appear from Mr. Mallet's observations to consist (1) of petroliferous shales and sandstones with nodules and strangulated beds of impure limestone and with shallow seams of lignite and coal, and (2) of minutely crystalline grey limestone,—all the strata being very irregular and being generally steeply inclined: as regards age the conclusion appears to be that they are Eocene Tertiary (Nummulitic) though the possibility is noted that some may be Cretaceous.

POLYCYATHUS, Duncan.

12. *Polycyathus andamanensis*, n. sp. Pl. V, figs. 6. 6a.

The colony is large enough to cover a *Conus* shell, 70 mm. in length, with a thin spongy crust. The corallites are small, very short, cylindrical, and are placed close together.

The costæ are distinct from the basal encrustment upwards, are alternately salient, and are usually covered with a white, vitreous epitheca.

The calices are open, shallow, and either circular or slightly elliptical. The septa, which are in four nearly complete cycles, are slightly and irregularly exsert: they are nearly equal in size and are coarsely granular.

The pali, which are in the form of strong denticulations, are distinct before all the septa.

The small deep-seated columella consists of a few small close papillæ.

The height of the corallites ranges from 2 to 3 mm., and the diameter of their calice from 3 to 7 mm.

The encrusting base and the epitheca are of a porcelain white, as are the tips of the septa; the calice wall, the septa, pali and columella being of a purple-black colour.

Dredged in the Andaman Sea by Professor Wood-Mason.

FAMILY OCULINIDÆ.

LOPHOHELIA, Edw. & Haime.

11. *Lophohelia*, sp.

Several dead branches of a species so eroded as not to be exactly determinable were dredged by the "Investigator" off the Konkan Coast in 446 fathoms.

I mention it as being the first observed occurrence of this family in Indian waters.

FAMILY EUPSAMMIDÆ.

BALANOPHYLLIA, Searles Wood, Duncan.

13. *Balanophyllia scabra*, n. sp. Pl. V, figs. 7. 7a.

Corallum simple, large, stoutly pedunculate, and gradually expanding, with a slight curve, into an elliptical calice.

The costæ, which are distinct from the base, are equal in size, uniform, and closely and conspicuously dentate.

The elliptical calice is deep.

The septa, which are crowded and very thin, are in five cycles, of which the last is not complete. Those of the first and second cycles are of equal predominant size and are slightly exsert. The quaternaries, especially those immediately adjoining the large septa of the first and second cycles, are larger than the ternaries, and unite with them not far from the columella. In those quarter-systems in which a fifth cycle of septa is developed these unite with the septa of the fourth cycle not far below the calicular margin, and the quinary nearest the large septa of the first and second cycles becomes the largest of the united triad. The edges of all the septa except those of the two first cycles are either ragged or cut into deep serrations, the teeth nearest the columella standing upwards like pali.

The columella is well-developed, spongy, and either plane or concave.

In the type specimen the greatest height of the corallum is 26 mm., the major diameter of the calicle 21 mm., and the minor diameter 15 mm.

Dredged by Professor Wood-Mason in the Andaman Sea.

EUPSAMMIA, Edw. & Haime.

14. *Eupsammia regalis*, n. sp. Pl. V, figs. 8., 8a.

Corallum simple, free with traces of former adhesion, curved, cornute, compressed.

Costæ distinct in the upper two-thirds of the corallum, occasionally trifurcating, united at regular intervals across the deepish intercostal incisions by horizontal spicules.

Calice elliptical with the major marginal axis on a slightly lower plane than the minor, deep, open.

The septa are in five cycles, of which the last is not complete, and are exsert. Those of the first two cycles are of equally predominant size and stoutness, while those of the other cycles are smaller and diminish in size in order, except that in the quarter-systems in which a fifth cycle is developed the quinary septum immediately adjoining the primary is larger than its neighbour of the fourth cycle.

The quinaries unite with the quaternaries much nearer to the columella than to the calicular margin, and close to the columella the quaternaries unite with the tertiaries.

All the septa are thick, spongy and perforate at their exsert tips and near the wall of the calice, but they soon become thin and dense with surfaces so finely granular as to appear quite smooth to the naked eye.

The columella is broad, spongy, and strongly convex.

The colour of the corallum is white, of the soft parts bright scarlet.

The greatest height of the corallum is 27·5 mm., the major diameter of the calice 25 mm., and the minor diameter 17·5 mm.

Dredged by the "Investigator," off Ceylon, in 32 fathoms.

HETEROPSAMMIA, Edw. & Haime.

15. *Heteropsammia geminata*, Verrill.

Heteropsammia geminata, Verrill, American Journal of Science and Arts, second series, vol. xlix. 1870, p. 370. fig. 1.

About two hundred and fifty specimens were dredged by Professor Wood-Mason in the Andaman Sea. All have the base perforated and tunnelled.

16. *Heteropsammia rotundata*, Semper.

Heteropsammia rotundata, Semper, Zeitschr. Wiss. Zool., vol. xxii. 1870, p. 265, taf. xx, fig. 10.

I refer to this species several specimens from the Persian Gulf presented by Mr. W. T. Blandford, F.R.S.

17. *Heteropsammia aphrodes*, n. sp. Pl. V, figs. 9, 9a. Near *Heteropsammia ovalis*, Semper.

Corallum with a single calice, the wall formed of a fine lace-like reticulum (not spongy as in other species).

Calice oval and deep, its major diameter being not much less than that of the base—the basal "spur" excluded.

Septa in four beautifully regular and complete cycles. Those of the first two cycles are of equally predominant size, are exsert, and are very thick, inflated, spongy, and porose, even up to their edges. Those of the fourth cycle are rather larger than those of the third, and unite in front of them, with beautiful symmetry, near the columella.

The deeply seated columella is well developed, and is slightly concave.

The greatest height of an average corallum is 10 mm., with a calice having a major diameter of 10 mm., and a minor diameter of 8 mm.

Numerous living specimens were dredged by the "Investigator" off the Ganjam Coast, at a depth of 20–25 fathoms, and every one of them was provided with a commensal Sipunculoid worm.

With specimens kept alive for a short time on board it was observed that the worm was able to propel the coral in a rapid series of short jerky spiral movements.

The movements were performed with great ease, and there appears to be little doubt that we have here to do with a true case of commensalism, in which the worm serves the polyp as a locomotive agent, while the polyp affords particularly effectual protection—owing to its power of urtication—to the worm. As Professors Moseley and Semper observed in their species of *Heteropsammia*, the worm lives in a tunnel hollowed out of the coral-tissue, and no traces of any adventitious shell can be discovered forming a core.

In addition to the aperture for the exit of the worm, which is found in a special spur-like process of the base of the corallum, the side of the corallum about half way up is ringed with small punctures. Similar punctures are found in the coralla of other species of *Heteropsammia* and also *Heterocyathus*, and Professor Moseley regarded them as respiratory apertures for the use of the commensal worm.

DENDROPHYLLIA, Edw. & Haime.

18. *Dendrophyllia* sp.

From the Orissa Coast, at 10 fathoms, we have a bush-shaped colony of long slender cylindrical corallites resembling *Dendrophyllia gracilis*, Edw. & Haime, in all respects except in the form of the columella which is very strongly convex, in some cases almost styliform, instead of being plane.

CŒNOPSAMMIA, Edw. & Haime.

19. *Cœnopsammia* sp.

From the Arrakan, Orissa and Ganjam Coasts respectively, we have three species of *Cœnopsammia* of the type of *C. urvillii*, Edw. & Haime, the colonies being in massive tufts from which the units of the colony project little or not at all.

I consider it better not to name any of these species until we have more material for comparison.

RHODOPSAMMIA, Semper.

20. *Rhodopsammia carinata*, Semper.

Rhodopsammia carinata, Semper, Zeitschr. Wiss. Zool., vol. xxii. 1872, p. 257, taf. xix. fig. 6.

Numerous specimens were dredged by Professor Wood-Mason in the Andaman Sea, and by the "Investigator" off Ceylon in 32 fathoms. The gemmation from the calicular margin is well seen in both series of specimens.

21. *Rhodopsammia socialis*, Semper.

Rhodopsammia socialis, Semper, tom. cit., p. 260, taf. xx. fig. 1–14.

Several specimens were dredged along with *R. carinata*, both in the Andaman Sea and off Ceylon. Among them is a specimen showing budding to the third generation.

FAMILY FUNGIDÆ.

CYCLOSERIS Edw. & Haime.

22. *Cycloseris mycoides*, n. sp. Pl. V, fig. 10.

Corallum almost circular, gently convex, with a flat or slightly concave base, from the centre of which close-set, equidistant, alternately, unequal costæ radiate—the larger ones being finely lamellar, while the alternate smaller ones are composed of a single series of fine granules.

The septa, which are in seven very regular and complete cycles, are close-set and convex, with very finely and evenly denticulate edges and very finely and striately granular surfaces. Those of the first two cycles are of equally predominant size and touch the columella, while those of the last two cycles do not reach half-way to the columella. Those of the fifth cycle unite together in each quarter-system in front of their quaternary, the united pairs then showing a tendency to further unite in each half-system in front of their tertiary.

The central fossa is long, narrow, and moderately deep, and lodges a narrow loosely reticulate columella.

The synapticulæ are numerous and coarse.

In an average specimen the major diameter of the corallum is 23·5 mm., and the minor diameter 23 mm.

Dredged by Professor Wood-Mason in the Andaman Sea.

This species differs from *Cycloseris cyclolites*, with which I have compared it, in the much greater delicacy regularity and symmetry of all its parts: it appears to be near *Cycloseris sinensis*, Edw. & H., and *Cycloseris discus*, Quelch.

DIASERIS, Edw. & Haime.

23. *Diaseris distorta*, Edw. & Haime.

Diaseris distorta, Milne Edwards and Haime, Hist. Nat. des Corall., vol. iii. p. 55, pl. D. 12, fig. 4.

Several specimens were dredged by Professor Wood-Mason in the Andaman Sea.

24. *Diaseris freycineti*, Edw. & Haime.

Diaseris freycineti, Milne-Edwards and Haime, Hist. Nat. des Corall., vol. iii. p. 55; and Semper, Zeitschr. Wiss. Zool., vol. xxii., 1872, p. 269, taf. xxi. fig. 1.

Several specimens dredged by Professor Wood-Mason in the Andaman Sea. In all the specimens, except two very young ones, the corallum is tunnelled apparently by a worm, just as in *Heterocyathus* and *Heteropsammia*, except that the aperture for the exit of the worm instead of being on the base is at one side of the oral fossa.

Before going on to describe a new species of the genus *Diaseris*, I must here remark that our beautiful series of *Diaseris freycineti*, and of the species about to be described do not support Mr. Quelch's opinion that the species of *Diaseris* are merely the results of the fracture and repair of *Cycloseris*.

25. *Diaseris fragilis*, n. sp. Pl. V, fig. 11.

The corallum is flat and very thin. In its youngest stage the corallum is almost circular with a triangular lobe breaking through an arc of about 90° of its circumference and projecting to form a sector of a much larger circle.

This lobe appears with age to spread round the original disk until this in turn becomes a small lobe occupying not much more than 50° of the circumference of the grown coral.

The full-grown coral forms an irregular ellipse divided into four lobes in opposite pairs, one pair being large (each lobe with a margin equal to about 180° of the entire circumference), and the other pair being small (each lobe with a margin extending through about 55° of the entire circumference). The lobes are very distinctly delimited up to the very centre of the corallum, which has the appearance of being composed of four artificially cemented pieces.

The costæ are in the form of very close delicate granular striations, alternately unequal.

The septa, which appear to be in eight cycles in six irregular systems, are thin with very finely and evenly serrate edges and granular surfaces: they are usually low, but the primaries and secondaries are unequally elevated near the fossa.

The synapticulæ near the centre are coarse, close and equidistant, and form regularly concentric circles, as in *Bathyactis*, throughout the interseptal chambers: near the margin they are much more delicate, and are not equidistant.

The fossa is conspicuous and a columella is usually absent, although sometimes a few distant papillæ are visible.

The largest specimen measures 50 mm. in the major diameter and 41 mm. in the minor and is not more than 6·5 mm. in height to the tip of the highest septum.

Dredged in the Andaman Sea by Professor Wood-Mason.

BATHYACTIS, Moseley.

26. *Bathyactis stephanus*, n. sp. Pl. V, figs. 12, 12a.

Corallum very thin and fragile, circular, strongly convex, the base forming an inverted bowl. The costæ radiate from the centre and gradually become laminar or crested as they approach the margin: the primaries are the most distinct.

Septa in six regular systems and five complete cycles arranged exactly as in *Bathyactis symmetrica*. Those of the first three cycles are foliaceous, with crenulated surfaces and irregularly lobate edges.

Synapticulæ distinct in ten to twelve zones, which though fairly regularly concentric do not at once attract the eye by this character as they do in *Bathyactis symmetrica*. Columella distinct, umbilicated.

Diameter of corallum 34 mm., its greatest height from margin of base to the tips of the tallest foliaceous primary septa 17 mm.

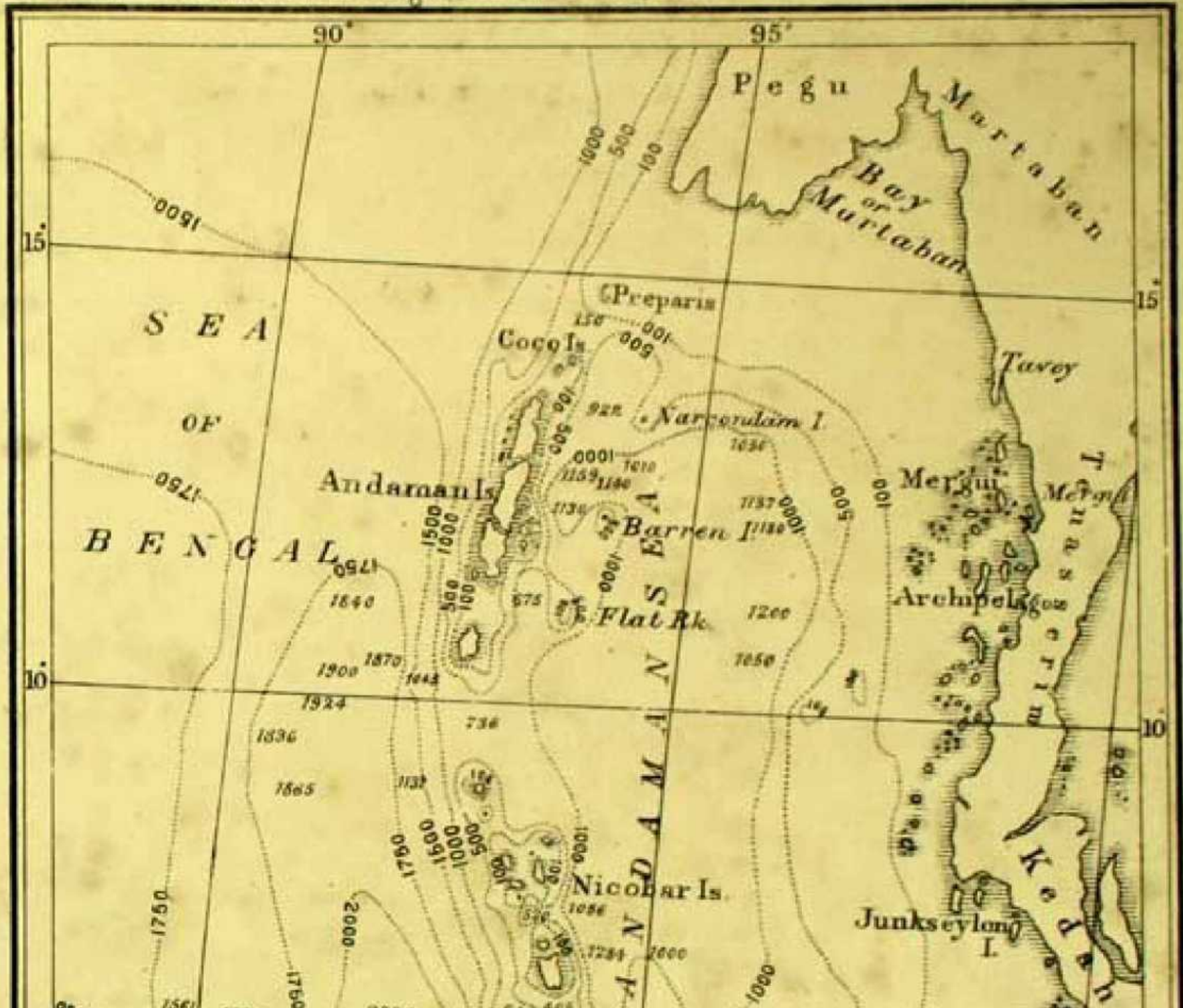
The colour of the soft parts is a ruddy mauve.

Four specimens from the Bay of Bengal off the Kistna Delta in 678 fathoms.

EXPLANATION OF THE PLATE.

Figs. 1, 1a, *Paracyathus cavatus*, natural size;
Figs. 2, 2a, *Paracyathus fulvus*, natural size;
Figs. 3, 3a, *Paracyathus porphyreus*, natural size;
Figs. 4, 4a, *Heterocyathus wood-masoni*, natural size;
Figs. 5, 5a, *Discotrochus investigatoris*, enlarged five times;
Figs. 6, 6a, *Polycyathus andamanensis*, natural size;
Figs. 7, 7a, *Balanophyllia scabra*, natural size;
Figs. 8, 8a, *Eupsammia regalis*, natural size;
Fig. 9, *Heteropsammia aphrodes*, natural size; and 9a, viewed from above, enlarged twice;
Fig. 10, *Cycloseris mycoides*, natural size;
Fig. 11, *Diaseris fragilis*, natural size;
Figs. 12, 12a, *Bathyactis stephanus*, natural size.

PRAIN, Jour. Asiat. Soc. Bengal, 1893, Vol LXII, Pt. II.

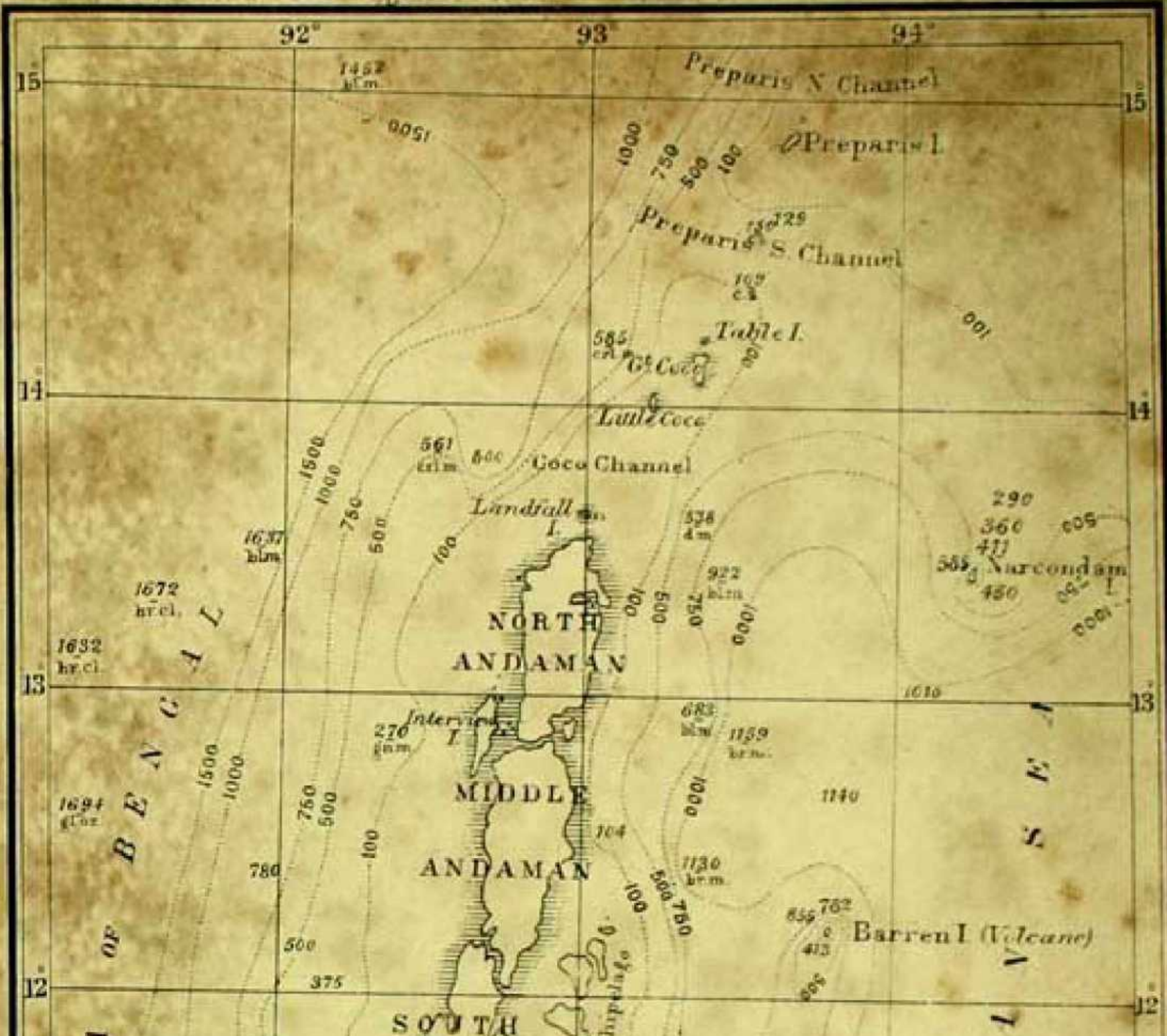


SKETCH MAP
of the
ANDAMAN SEA.
Soundings in Fathms.

D. Prain delt.

A. C. Mukerjei lith.

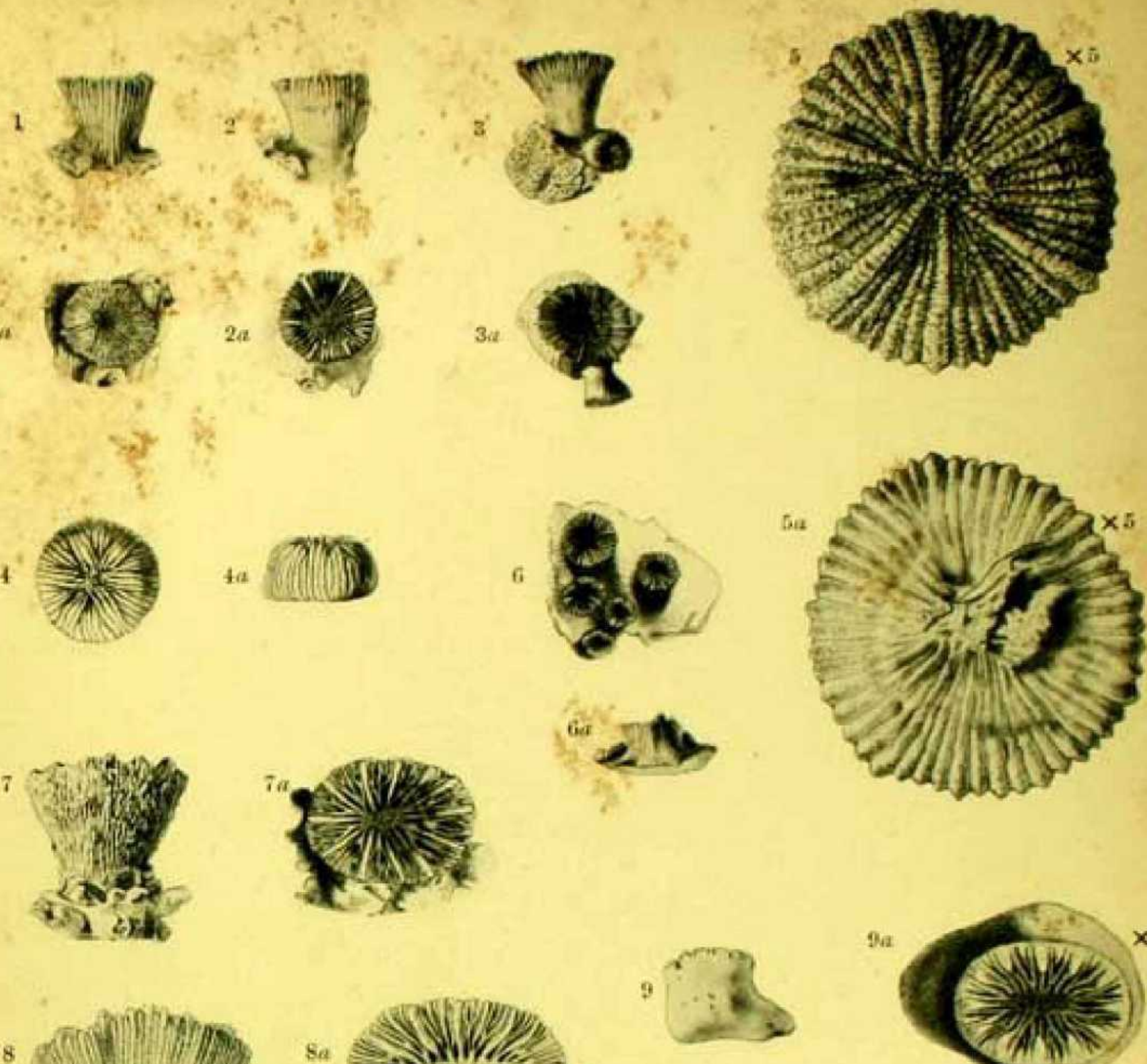
PRAIN, Jour. Asiat. Soc. Bengal. 1893, Vol. LXII, Pt. II.　　PLATE IV.



SKETCH-MAP
of the
ANDAMAN GROUP.
Soundings in Fathoms.

D. Prain delt.　　A. C. Mukerjei lith.

ALCOCK, Jour. Asiat. Soc. Bengal, Pa Pl. V.



CORALS FROM THE INDIAN SEAS.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Vol. LXII. Part II.—NATURAL SCIENCE.

No. III.—1893.

On some Actiniaria *from the Indian Seas. By* A. Alcock, M.B., C.M.Z.S., *Offg. Superintendent of the Indian Museum.*

[Read July 5th.]

In this short paper I propose to notice only the two aberrant Tribes, *Zoantheæ* and *Cerianthineæ*.

I. Zoantheæ.

The *Zoantheæ* are a tribe of sea-anemones distinguished, according to the limitations of R. Hertwig in his Report on the 'Challenger' *Actiniaria*, where full references are given, by the possession of septa of two kinds—larger septa (*macrosepta*) which alone bear mesenteric filaments and reproductive organs, and smaller septa (*microsepta*) which are sterile.

The *Zoantheæ* include two families—the *Zoanthidæ* which are peculiar among all sea-anemones in forming colonies of which the units are connected together by a canaliculated coenenchyma, and the *Sphenopidæ* which are solitary in the sense that the individuals are not morphologically connected, but appear to be gregarious in habit.

The majority of the *Zoantheæ* are characterized by the possession of a thick test very homogeneously compacted of small grains of sand.

The following genera and species occur in the Indian Seas, and are represented in the collection of the Indian Museum :—

FAMILY Zoanthidæ.

ZOANTHUS, Cuv.

1. *Zoanthus confertus*, Verrill.

This species was dredged by the "Investigator," the exact locality being uncertain, but probably off the Pegu coast.

2. *Zoanthus solanderi*, Lesueur.

This species occurs at Galle.

EPIZOANTHUS, Verrill.

3. *Epizoanthus stellaris*, R. Hertwig.

Two species of *Epizoanthus* very commonly occur in the Andaman Sea, at depths of 200 to 500 fathoms, encrusting the anchor-ropes of the glass-rope sponges (*Hyalonema*): one of them appears to be identical with the above-named species from the Philippine Sea.

FAMILY Sphenopidæ.

SPHENOPUS, Steenstrup.

4. *Sphenopus marsupialis*, (Gmelin).

This species is very common in shallow water all along the eastern coast of India, especially on the soft muddy bottom at the debouchement of the great rivers.

I can never recollect dredging it except in mass, and this seems to point to the conclusion that it is gregarious.

5. *Sphenopus arenaceus*, R. Hertwig.

We have six specimens from the Sandheads.

It is readily distinguished from *S. marsupialis* by the cylindrical body, by the thinner test, by the double row of tentacles, by the less powerful oral sphincter, and by the character of the œsophageal groove which although very distinct is not such a deep-cut channel as it is in *S. marsupialis*.

6. *Sphenopus arenaceus*, var. *barnettii*.

I propose to notice separately a variety in which there is a constant difference in external form, the oral end of the body being inflated, while the lower part forms a long vermiform peduncle. The external appearance, in short, approaches the figure of *Sphenopus pedunculatus*, Erdmann, R. Hertwig, in vol. XXVI of the 'Challenger' Reports Actiniaria, Suppl., Pl. I., fig 11.

The variety comes from the Sandheads, where it was dredged by Mr. Barnett.

II. CERIANTHINEÆ.

The *Cerianthineæ* are distinguished from other sea-anemones (R. Hertwig, 'Challenger,' Reports, vol. VI, p. 123) in having the septa unpaired.

CERIANTHUS, Delle Chiaje.

7. *Cerianthus andamanensis*, n. sp.

The body is loosely encased, up to the outer tentacular crown, in a soft sheath of a dull cinnamon-brown colour, the oral disk between the two crowns of tentacles is of the same colour but lighter, and the tentacles with the central part of the oral disk are creamy white.

The tentacles of the outer crown are very thick-set, and number about 160; those of the inner crown are not nearly so thick-set, and number hardly half as many.

The septa and mesenteric filaments extend to the bottom of the gastral cavity.

The base is perforated centrally.

Three specimens from Port Blair. In the contracted state the shape of the body is beautifully caryophyllaceous, and the length of the largest specimen is a little short of four inches—(99 millim.) This species appears to be very close to *Cerianthus americanus*, Verrill, which it aproaches in size, judging from the magnitude of the spirit specimens.

Note on some methods of preparing botanical specimens, communicating Memoranda by MESSRS. C. MARIES, F.L.S., *and* R. PANTLING.—*By* D. PRAIN, M.B.

[Read June 5th.]

Usually the preparation of botanical specimens is easy; some natural families, however, give a good deal of trouble. Those who have private herbaria are as interested to hear of improved methods of treating such families, as are those who look after public collections. The writer, therefore, would call general attention to modes of dealing with three troublesome families—*Magnoliaceæ*, *Coniferæ* and *Orchidaceæ*.

I. MAGNOLIACEÆ. The *Champak* family is not troublesome to preserve as to the leaves, but the flowers are apt to go to pieces. If, however, pieces of blotting-paper are carefully insinuated between the petals before the specimen is laid in drying-paper, and if the specimen is then rapidly fire-dried, even adult flowers may be preserved entire. Nothing, however, prevents the shrinkage of the large leathery petals. In this order shrinkage is so excessive and so unequal, that in the case of herbarium specimens the estimation of the size of the flowers becomes to some extent guess-work.

Those who know Rangoon may recollect the practice of selling bottles of flowers on the stairs of the Shwe-Dagon Pagoda. Unless, however, their stay has been long enough, or their interest sufficiently great, to have led them to notice that the flowers in these bottles are not fresh but preserved, they may have supposed, as the writer did, that the medium in which the flowers are kept is water.

Everyone, however, has not been so void of curiosity. When Assistant Surgeon C. L. Bose,* was in Rangoon in 1885, he was struck by the length of time the flowers were kept, and brought some with him to Calcutta for examination. Dr. Warden, then chemical examiner, and Mr. Bose found on examining the fluid that it was a solution of Alum. The solution is of no special strength; the Burman, being a happy-go-lucky individual puts some Alum into the water along with the flowers and is not particular as to the amount.

Mr. Bose brought only *Champak* petals; some of these are in shape, size, colour and consistence much as they were when taken from the tree eight years ago. Here then we seem to have the means of overcoming the difficulty, hitherto insoluble, of preserving the natural size in specimens of *Magnoliaceous* flowers.

Though only *Champak* was brought by Mr. Bose, the writer recollects seeing *Plumieria* and *Nymphæa* flowers as well, and a bottle in which Dr. Warden placed some green leaves with a 1°/。 Alum solution at the time he examined the Rangoon bottle has its contents very much as they were when he put them in. There is, therefore, no reason why the use of Alum solution should be confined to *Magnolia* flowers.

It should be understood that the use of Alum solution is only suggested as an auxiliary to the usual means of preserving specimens. Wet preparations are to be avoided; they are difficult to handle, difficult to keep, difficult to house, and still more difficult to carry about. But occasions arise when wet specimens are of the greatest moment as supplements to dried ones, and the Burmese preservative has the advantages over spirit of not discolouring the specimen or rendering it brittle. Most important of all, one can carry Alum about as a solid and make a solution when required.

If the bottles are not carefully sealed the specimens do not keep. The flowers immersed in the fluid do not suffer, but as the water evaporates the flowers at the top get exposed to the air, decay, and fall in a flocculent mass to the bottom. This flocculent matter keeps pushing up others to undergo the same decomposition. But from a well-stoppered bottle—

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* Assistant to the Chemical Examiner to Government, Calcutta.

a glass stopper with wax is best—the fluid does not evaporate; the flowers, therefore, do not reach the air and seem to keep indefinitely.

II. CONIFERÆ. The *Pine, Fir* and *Spruce* family is usually very troublesome to preserve both in the field and afterwards in the Herbarium, from the readiness with which the cones fall to pieces and the leaves (needles) drop off. In the Calcutta Herbarium there are a number of beautiful specimens of Japanese *Conifers* presented by Mr. C. Maries, F.L.S.,* who collected them. The writer anxious to learn the secret of the success with which so troublesome a family had been treated asked Mr. Maries if he would kindly explain his method. Mr. Maries' reply, which he has courteously permitted the writer to communicate to the Society, is as follows :—

" *Conifer* specimens of the *Abies* or *Picea* section are generally rather " difficult to dry. When I was in the island of Yesso, in the North " Pacific, I was very much troubled with them. One night I arrived " very wet at my rooms and stacked my branches of *Abies*, with the " cones attached, round a big charcoal fire. I fell asleep and woke up " next morning to find my specimens dried beautifully. After this I " always dried them slowly over a charcoal fire, first wiring or wrapping " up the cones. All fir-cones, except Pine, or Spruce, or Cedar, should " be tied up either with cotton or wire immediately they are gathered. " The Spruce section is the most difficult to dry, even roasting is not " always a success."

Mr. Maries goes on to say :—" The way I dry ferns and leaves " of trees for fitting up my bird-cases " (in the Gwalior State Museum) " to preserve their natural shape, is to take some very *clean*, washed " sand, arrange the leaves in a *clean* box and fill in with hot sand, and " keep at a temperature of 100° to 120° Fh. or even more. They soon " dry (I imagine Spruce would dry like this if very hot) and flowers " dry beautifully in this way, some keeping their natural colours in a " most remarkable manner. When I was young and living in London, an " old gardener taught me this; he used it for ferns and roses for winter " decorations when fresh ferns and flowers were scarce. All the dried " flowers one sees in florists' shops in London are dried in hot sand. "—C. MARIES."

III. ORCHIDACEÆ. The *Orchid* family is perhaps the most troublesome of all natural families to represent in Herbaria. In all the epiphytic kinds the leaves and, in most of them, the flowers also are apt to drop off when the specimens are dried in the ordinary way, while even in ground Orchids the pressure that has to be applied during drying usually so distorts the flower that a true conception of the relative position of its parts becomes impossible. This is very unfortunate, because there is no natural order where a proper understanding of the position of parts, particularly of the lip and the column, is so necessary. Spirit preparations are most unsatisfactory. If the spirit is sufficiently strong to preserve the flowers the parts become so brittle that when handled they go to pieces; if weak enough to prevent this hardening and consequent friability the spirit does not adequately preserve the specimens. The jars and bottles in which the specimens are placed, moreover, are very apt to get broken, and any one who has tried it will testify to the worry that is caused by the necessity of having to carry about a stock of alcohol. Dr. Schweinfurth when travelling in Africa, made use of a most excellent modification of the method of preservation in spirit. He laid his specimens between sheets of drying paper, laid these in tin-boxes and soldered them up after soaking the paper thoroughly with spirit. He was thus able greatly to reduce the initial stock of alcohol and was freed from the subsequent anxiety of possible breakages. But the objections to spirit as a preserving medium for flowers are not obviated by this mode of applying it, and it remains to be seen whether the Alum solution will answer as a subtitute if used in this way.

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* Superintendent of the State Gardens and State Museum at Gwalior.

In the meantime Mr. R. Pantling,* who for many years has made a special study of Orchids, has perfected a method of drying them so far in advance of anything hitherto accomplished that it is highly desirable, that the details of his process should be made known. At the writer's request Mr. Pantling has supplied these details and like Mr. Maries, has courteously given him permission to communicate the account to the Society. This memorandum is given below; it will be noticed that it consists of a happy combination, suitably modified, of the ordinary method of fire-drying recommended for all ordinary plants with the hot-sand process mentioned by Mr. Maries as that practised by florists in Europe.

" *To dry Orchid Specimens.*—In order to preserve *Orchids* so that " the leaves and flowers remain intact and do not fall away in fragments " as invariably happens to epiphytal species when pressed in the ordi- " nary way between drying paper, the procedure to be adopted should " be as follows. Procure a light metal box—14 inches, by 12 inches, " by 6 inches deep is a convenient size—and place over the bottom half- " an-inch of sand. Arrange a specimen between two sheets of thin " paper inside the box and cover over with a layer of sand taking care, " as far as possible, that the interstices between leaves, etc., are filled " up. Repeat this until the box is full, then place it on a stove or above

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* First Assistant, Department of Cinchona Cultivation in Bengal.

“a fire and dry with a brisk heat. No weights for pressing are neces-
“sary. As a general rule, the sand at the commencement of drying
“should not be allowed to attain a greater heat than can be borne by
“the hand, and this should be lessened as drying proceeds or the flowers
“may become scorched and rendered useless for purposes of dissection.

“Occasionally species (*Dendrobium Pierardi* Roxb., and *Phajus*
“*alba* Lindl.) are met with whose perianths will adhere to the paper;
“the removal of the perianth cannot then be effected without mutilation.
“This may be obviated by using porous drying-paper or blotting-paper
“instead of the thin kind recommended above.

“The advantages of drying in hot sand as compared with the
“universally adopted method in paper are:—*First*, the rapidity in pre-
“paring specimens; plants belonging to such genera as *Saccolabium*,
“*Vanda*, *Cleisostoma*, etc., being ready within a week against a period of
“three to four months by the old method. *Secondly*; when finished the
“specimens will be found preserved in their entirety and will not fall
“to pieces. The column and lip will be found to have suffered little,
“as the pressure of the sand is not sufficient to cause any material dam-
“age to these organs”.—R. Pantling.

The boxes that Mr. Pantling has found handiest for his purpose are old kerosine tins cut through lengthways; one is placed within the other to give more strength to the tin and a rivet or two hammered through the seams as the solder runs when the boxes are over the fire. The only thing to be guarded against in the process is the adhesion of the flowers of certain species to the paper, and Mr. Pantling shows how this is easily overcome.

The possibilities of this method either as recommended by Mr. Pantling or with slight modifications for the drying of succulent species generally, such as the *Cactus* family and fleshy members of the *Spurge* family, as well as for families like *Scitamineæ*—the ginger family—and for water plants, where the flowers are very delicate and therefore very difficult to dry seem considerable and the plan is well worth trying for them as well as for orchids.

Blind root-suckers of the Sunderbans.—By R. L. HEINIG, *Deputy Conservator of Forests, Bengal, Communicated by the Natural History Secretary. Plate VI.*

[Read August 2nd.]

The name "Sunderbans" is applied to the tract of littoral forest and cultivation that occupies the southern portion of the Ganges Delta, extending from the Hooghly river to the Meghna in the districts of the 24-Parganas, Khulna, and Backergunge. This tract is, roughly, 5,000 square miles in area, and comprises a large number of low-lying swampy islands formed by the principal rivers and their connecting water-channels.

The State Forests occupy the portion that extends from the Hooghly river to the Baliswar, on the western border of Backergunge. They are divided, both geographically and as to their legal status, into two approximately equal and well-defined areas, namely, the *Protected* Forests, extending from the Hooghly river to the Raimangal, in the district of the 24-Parganas; and the *Reserved* Forests, extending from the Raimangal river to the Baliswar in the Khulna district.

The *Protected* Forests are traversed by rivers not directly connected with the Ganges, and resembling estuaries or long arms of the sea; these rivers are very saline and subject to tidal influences throughout.

The principal species of forest tree is *Gozán* (*Ceriops Candolleana*, Arn.), a tree that does not develop root-suckers, but has short buttresses. It reproduces itself abundantly, and the innumerable stems and tangled roots of this species and of others with which it is associated, *Gengwá*, (*Excæcaria agallocha*, Linn.); *Hantál*, (*Phœnix paludosa* Roxb., &c.), serve, in the absence of herbaceous undergrowth, to protect the surface soil from erosion during tidal inundations, and to induce the deposit of alluvial mud.

The *Reserved* Forests are traversed by rivers directly connected with the Ganges, that bring down vast bodies of fresh water, especially during the rains. The principal species of forest tree is *Sundri* (*Heritiera fomes*, Buch.). The accessory species are *Pussur* (*Carapa moluccensis*, Lam.), *Amúr* (*Amoora cucullata*, Roxb.), *Keora* (*Sonneratia apetala*, Lam.), *Ora* (*S. acida*, Linn. f.), and a few others. Each island is bordered by a zone of characteristic growth consisting of *Golpatta* (*Nipa fruticans*, Wurmb.), *Hantál*, species of the mangrove family, *Keora*, *Ora*, *Kúmia* (*Barringtonia racemosa*, Blume.), &c. Behind this zone of riparian growth occurs the *Sundri* forest, pure, or mixed with a few inferior species. Towards the sea coast, where the water of the rivers is markedly saline, especially during the dry months of the year, *Gorán* and *Gengwá* form the predominating species, and *Sundri* trees are comparatively few in number, and of inferior growth. The *Sundri*-producing tract resembles that on the west in the general absence of grass and other herbaceous vegetation, but differentiates from it entirely by the presence of innumerable blind root-suckers.

The magnificent rivers that traverse the Sunderbans, many of them of considerable breadth and depth, bring down, during the monsoon months, vast quantities of silt, some of which is deposited to form *churs* or sand-banks.

On the subsidence of the waters at the close of the rains those sand-banks, the surface of which is left exposed at low tide, are soon covered by a luxuriant growth of grass which effectually binds the soil, induces further accumulations of silt, and arrests floating seeds.

It is not surprising that under the forcing conditions of a rich soil, a moist warm climate, and abundance of light, seedlings on these new islands should make extremely rapid growth, forming in a few years an uninterrupted canopy, in the dense shade of which it is impossible for the grass to live.

When the grass has disappeared there is a continual danger of the island wasting away by erosion, the banks being liable to be undermined and swept away by the rivers, and the whole surface, inundated during high spring-floods, is subject to denudation under the considerable force (to be seen to be fully appreciated) with which the water pours away at every point of egress after the tide has turned.

The soil of the islands eventually consists of a thin top-layer of alluvial mud overlying a thick layer of moist, black soil in which the large quantities of wood *débris* that accumulate in these forests undergo slow decomposition with the generation of gases having the odour of sulphuretted and carburetted hydrogen. The top-layer of soil excludes atmospheric air, and imprisons the gases generated in the miasmic mud beneath. Occasionally the gases find vent along river banks at low tide, and during storms when the stems of the forest trees sway to and fro and cause the upper layers to be disturbed.

Each species of tree found growing in the swamp-forests of the Sunderbans has a root-system well adapted not only to anchor the tree firmly in the unstable medium below, but also to protect the mud from the effects of erosion. The roots do not penetrate the soil to a greater depth than 8 to 10 feet, but in this shallow layer they form a tangled and confused net-work in which the tap-root is not distinguishable. Some species produce adventitious roots, and others buttress freely, even at an early age; but perhaps the most curious adaptation of all, of means to ends, is to be found in the development of blind root-suckers.

The following species of forest trees in the Sunderbans produce blind root-suckers, namely, *Sundri*, *Pussur*, *Amúr*, *Keora*, *Ora*, and *Báen* (*Avicennia officinalis*, Linn.).

The root-suckers are woody processes, growing in an upward direction, and developed at irregular distances along the whole course of the roots of the above-mentioned species. They project from 1 to 3 feet above the surface of the ground, and apparently cease to make further growth upwards when the apex has reached the level of the highest spring-tides. They are called blind from the circumstance that they are destitute of buds, and incapable of producing buds under any conditions. The portion below ground is often furnished with rootlets, but the part above ground is invariably naked. The tender tops of the suckers are frequently gnawed by pig and deer, but this does not destroy their vitality, and only results in the formation of apical knobs and bifurcations.

The mechanical effect of the root-suckers of all the species that develop them (except *Báen*) is to enormously increase the holding power or grip of the roots on the soil, and thus to cause a far greater resistance to be offered to the uprooting of trees by storms, and generally to maintain the stems of the trees in an upright position; to prevent the erosion of the surface soil during high-tide inundations; to check the force of the egress of flood-water, and to induce deposits of alluvial mud; to detain seeds floated on to the islands at high tide, and thus aid in the natural reproduction of all species; to arrest fragments of fertilising wood *débris* that would, in the absence of the root-suckers, be swept into the rivers.

The accompanying plate illustrates the general form and relative length of the root-suckers of different species.

Sundri suckers are far more numerous than those of any other species, and their flattened shape renders them fit to fully exercise all the mechanical functions noted above. The suckers of *Pussur* and *Amúr* are met with in the low-lying localities affected by trees of these species; they are consequently, as a rule, much longer than those of *Sundri*. The suckers of *Keora* and *Ora*, species that are found only on river banks, are short on the high ground of the banks and long on the river-side. This accords with the general observation that the upward growth of a sucker continues until its apex has reached the level of high-water mark.

Keora sends out very long roots into the mud of river beds. These roots act as spurs deflecting the course of the current, causing accumulations of silt, and sometimes leading to the complete silting up of rivers. Innumerable suckers proceed from these roots up to distances of 150 feet and more from the parent tree, and aid in fixing whatever silt has accumulated, and inducing the deposit of more. These suckers are exposed at low tide, but are subjected to long-continued submergence daily until the bank has risen sufficiently to allow the tops to remain above the level of high tide.

Báen suckers are of exceptional interest. Their form and flexibility render them almost useless as agents for the prevention of erosion and the arrest of silt, seeds, and wood *débris;* and it is certain that they do not have the effect of enabling trees of this species to maintain a vertical position. *Báen* trees after attaining a girth of 2 to 3 feet, incline from the vertical. In the case of large trees, 15 feet in girth and more, the inclination from the vertical is often considerable; but the trees of this size have long since passed their maturity, and are merely light, hollow shells.

The most interesting fact regarding the root-suckers of this species is that they have been found, on examination of the internal structure, to contain vessels that are supposed to serve as passages for the conveyance of atmospheric air to the roots.

It has been remarked that the top-layer of alluvial mud, a very fine silt, excludes atmospheric air from the lower stratum of miasmic mud wherein the wood *débris* of the forests decomposes and large quantities of gas are generated. The fact has also been noted that the root-suckers continue to make upward growth until their tops are above high-water level. It is accordingly considered probable that the root-suckers of all the species that produce these curious processes not only discharge the mechanical functions already referred to, but are provided with a structure that enables them to supply atmospheric air to the roots.

The Petrology of Job Charnock's Tombstone,—*By* THOMAS H. HOLLAND, A.R.C.S., F.G.S., *Geological Survey of India.*

[Received August 29th, Read November 1st.]

At the suggestion of the Rev. H. B. Hyde, I recently examined the tombstone preserved in the 'Charnock Mausoleum,' St. John's Churchyard, to the memory of Job Charnock.* Apart from its historic interest, the rock itself, being of a type hitherto undescribed, is of sufficient scientific value to call for a description.

The abundance of blue quartz, the occasional crystals of garnet, the black, and sometimes bronzy-looking, pyroxene, and the cleavage faces of the felspars are characters which are at once striking features in the hand-specimen.

Under the microscope, the rock is seen to be granitic in structure; that is, it is perfectly crystalline throughout, with the crystals mutually interlocked, and the intergrowth so perfect that in places a beautiful micro-pegmatitic structure results. The following minerals can be identified (1), Quartz. (2), Orthoclase (Microcline). (3), Plagioclase. (4), Hypersthene. (5), Garnet, and (6), Magnetite.

(1.) The QUARTZ-CRYSTALS are crowded with minute acicular inclusions, the structure of which cannot be made out with the microscope; they are arranged without discoverable regularity: and are probably the cause of the blue colour seen in hand-specimens. Blue quartz-crystals have been noticed before in granites and granitites, as in that from Rumburg in Sweden.

(2). ORTHOCLASE and MICROCLINE. Most of the potash-felspars show the remarkable and unmistakable microcline structure. Occasionally also the orthoclase is seen presenting the "streifige" appearance due to regularly arranged intergrowths with a plagioclase, giving rise to the structure described by Becke as micro-perthitic. To prove the identity of this felspar I have isolated crystals having a specific gravity of 2·59, and examined them chemically by Szabo's method.

(3). PLAGIOCLASE occurs only in small quantities. The isolated crystals show the characteristic twinning, with extinction-angles approaching those of oligoclase.

(4). HYPERSTHENE occurs, not in large quantities, but presenting its characteristic pleochroism and straight extinction. The presence of this mineral is a feature of exceptional interest from the fact that, so far as I am aware, a hypersthene-granite has never before been recorded, although the mineral has been frequently found as a constituent of the intermediate, basic and ultra-basic holocrystalline rocks. The precise reasons why the micas, hornblendes, and, more rarely, augites should occur as the ferro-magnesian constituents of granites, and not hypersthene, have never been accurately settled. The discovery of hypersthene, therefore, in this capacity fills a very well-marked gap in the granitic series, and for the time we can do no more than record as precisely as possible its nature and mode of occurrence, with the hope that in future the facts may be of service in framing an hypothesis for explaining the fact that chemically similar magmas, under special conditions of temperature and pressure during the process of consolidation, give rise to different mineral species.

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* Job Charnock died in 1693, and the tombstone was erected about two years later.

(5). GARNET of the almandine variety occurs very sparingly in the rock, and seldom shows anything approaching idiomorphic crystalline form.

(6). MAGNETITE in small grains is sparsely scattered amongst the other minerals.

The rock has a *specific gravity* of 2·646, agreeing thus with normal granites.

In microscopic and macroscopic characters this rock agrees with certain specimens which I have recently collected in the Madras Presidency. At different places in the south of India (Pallavaram in the Chingleput district, the Shevaroy and Nilgiri hills, in N.-W. Madura, and in Travancore) there occur exposures of igneous rock in which hypersthene is a constant constituent, and which at the same time exhibit every gradation in acidity, from hypersthene-granite, the most silicious (acid), to pyroxenite the most basic. These rocks, although their exposures are now separated by such distances from one another, I believe to have been derived from a common molten magma: they belong to one "petrographical province," and the differentiation of the originally homogeneous molten material into masses so widely distinct in chemical composition can be shown to be in agreement with well-established, though recent, physical principles.

The massive rocks of the Nilgiri Hills, and the Shevaroys, as well as the similar rocks found in the localities mentioned above, have been hitherto regarded as belonging to the great metamorphic series of the South. Observations made during recent visits to the Madras Presidency have, however, convinced me that this series, together with certain others not now under discussion, must be looked upon as intrusive igneous rocks of younger age than the normal gneiss.

The evidences for these conclusions I hope shortly to produce in detail. For the present, however, we are concerned in identifying

Job Charnock's tombstone with the pypersthene-granites of the Madras Presidency; and from its proximity to the cost and to Madras, it seems likely that Pallavaram would have been selected by the earlier agents of the East India Company as a source of this handsome rock. Nearly all the old tombstones collected together in St. John's Churchyard are of the same rock; for example that of Job Charnock's son-in-law, Jonathan White (1703), and Mrs. Jane Smart (1753).

Briefly, the points in which these rocks agree with those of Pallavaram, and upon which I base this identification, are these :—

(a). *Structure* :—
  (1). Micro-perthitic structure.
  (2). Granophyric (micro-pegmatitic) structure.
(b). *Composition* :—
  (1). The presence of potash-felspar in the form of microcline.
  (2). „ hypersthene.
  (3). „ blue quartz.
  (4). „ almandine garnet.

(c). *The combination* of these minerals with the above-named structures. In this association hypersthene is especially note-worthy for the reasons already stated.

As this is a new type of rock, and modifications of it occur by the introduction of accessory minerals, I would suggest for it the name *Charnockite*, in honour of the founder of Calcutta, who was the unconscious means of bringing, perhaps, the first specimen of this interesting rock to our capital.

On a slab of Chinese agglomerate lava bearing a Chinese inscription discovered in St. John's Churchyard, Calcutta. By T. H. HOLLAND, A.R.C.S., F.G.S., *Geological Survey of India.*

[Received October 26th;—Read November 1st, 1893.]

(With Plate VII.)

Through the kindness of the Revd. H. B. Hyde, I have been enabled to examine the slab bearing a Chinese inscription and discovered by him in St. John's Churchyard.

The slab has been imperfectly polished on the face bearing the inscription, and at first sight presents the character of a common artificial concrete, for which I at first mistook it. But on removing a fragment from the back of the slab and examining it in the laboratory, I found it to be a siliceous lava, which, though of course formed by natural means is, indeed, comparable to a concrete in ways other than appearances. It is a rhyolitic lava of a kind occurring in different parts of China, which, previous to consolidation, has included fragments of other rocks and now presents the patchy appearances of the agglomerate lavas and pipernos described by Fritsch and Reiss as varieties of eutaxite.*

Thin slices examined under the microscope leave no doubt as to the nature of the rock :—Corroded quartz-crystals embedded in a cryptocrystalline and microlitic magma are scattered irregularly through the slide. Occasionlly these preserve in part their original bi-pyramidal outlines, but the magma has corroded the majority of the crystals into irregular shapes. A curious feature worthy of record is the way in which many of the quartz-crystals are traversed by a series of cracks without discoverable regularity. These cracks recall the tessellated appearance of the polysynthetic porphyritic crystals described by Gen. McMahon in the eurite of Tushám Hill, 85 miles north-west of the town of Delhi.† But as a rule, in the present instance, the small fragments, although separated from one another by a series of cracks, all have the same optical orientation, whilst in the Tushám specimens the grains are, according to Gen. McMahon, oriented in different directions. I have found, however, one case of a quartz-crystal in which, after the formation of the cracks, many of the fragments have been slightly displaced, so that whilst the position of extinction is the same for the individuals in some of the pairs, others show slight differences, and still others have been moved through several degrees. Gen. McMahon explained the structure of the quartz-crystals in the Tushám rock as the result of rapid cooling after eruption, and I think the present case, in which many of the crystals are simply cracked more often without displacement of the fragments, are certainly more easily explained in this manner than by the other suggestions which, in his paper, Gen. McMahon has considered and rejected. Relief of pressure would also contribute to the same effect. A similar structure can be produced in clear quartz-crystals by rapidly cooling them from a red heat, the crystals becoming white and losing their transparency from a similar cause.

Next to the quartz-crystals in abundance amongst the porphyritic constituents are the felspars, some of which are of a plagioclase variety, and all greatly kaolinized. Black and brown patches of ferruginous material occur as relics of the ferro-magnesian constituents of the original rock. Secondary minerals like chalcedony occur in small quantities infilling cavities.

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* *Geologische Beschreibung der Insel Tenerife,* 1868, p. 420.

† *Min. Mag.,* Vol. VIII. (1888), p. 10.

Lumps of andesitic rocks are common as inclusions in the matrix, which in places shows damascened and eutaxitic structures.

The specific gravity of the rock is 2·35. Thin splinters fuse before the blowpipe to a white vesicular glass.

Comparison with Chinese rocks :—The peculiar structures presented by this rock are of especial interest from the way in which they can be parallelled amongst the Chinese eurites and rhyolites. The damascened structure and the included fragments of a similar andesitic rock I have previously described in the Korean acid lavas.*

Amongst the rocks which I have collected in China, there is a specimen of eurite from the Victoria Peak, Hong Kong, in which the porphyritic crystals of quartz are cracked in the same peculiar manner. The felspars, also, in this rock are in part plagioclastic, and irregular patches of small biotite bundles resemble in shape the ferruginous masses occurring in the slab. But although the Hong Kong rock shows a very distinct flow structure, the groundmass is composed wholly of microgranulitic material, and there is a notable absence of the andesitic foreign inclusions. Whilst, then, the porphyritic constituents of the slab agree with those of this rock, the groundmass shows that the conditions of consolidation were different; but although the circumstances of solidification were not the same there seems little doubt that the slab in St. John's Churchyard belongs to the same geological mass as the Hong Kong eurite, and both these are members of the acid series of igneous rocks—granites, granitites †, eurites and rhyolites—which can be traced from the Island of Hainan, north-east through Hong Kong to Foochow, and are repeated in a parallel band which reaches the sea-coast at Chusan, are repeated in the Korea, and possibly represented again by the central granitic axis of Kamtschatka. These rocks probably belong to one petrographical province and are the relics of a great chain of eruptions which took place in East Asia during middle carboniferous times. The granites and eurites are found intruding into the limestones which occur below the coal-bearing series; whilst fragments of these rocks are the principal constituents of the conglomerates which lie at the base of the coal-measures. The out-crop of these rocks is approximately parallel to the general strike of the stratified series, following the directions of the principal mountain ranges, which in East China Pumpelly has described as the Sinian system of elevation.[*] Elsewhere I may have occasion to refer to these features in greater detail: for the present I have referred to them for the purpose of showing that, whilst I think the slab found in St. John's Churchyard is undoubtedly of Chinese origin, it may have been brought from any of the localities in East China and Korea where these characteristic, acid, igneous rocks prevail. In what manner the slab was brought to India will doubtless appear from Mr. Hyde's researches.

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* *Quart. Journ. Geol. Soc.*, Vol. XLVII. (1891), pp. 176–178.

† The prevalence of granitite and the occurrence of its representatives amongst the hemicrystalline and felsitic rocks are striking features in these Chinese rocks, and I regard them as a later stage in the eruptions which first gave rise to diorites and andesites—rocks which I have frequently found associated with and included in the later acid eruptions of China.

EXPLANATION OF PLATE.

Figs. 1 & 2. From slab of Chinese agglomerate lava found in St. John's Churchyard.
  Fig. 1. Bi-pyramidal crystal of quartz corroded by the magma.
  Fig. 2. Crystal cracked and corroded.
Figs. 3 & 4. From eurite. Victoria Peak, Hong Kong.
  Fig. 3. Bi-pyramidal crystal of quartz corroded by the magma.
  Fig. 4. Crystal cracked and corroded.

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[*] Geological Researches in China, Mongolia, and Japan, 1866, p. 67.

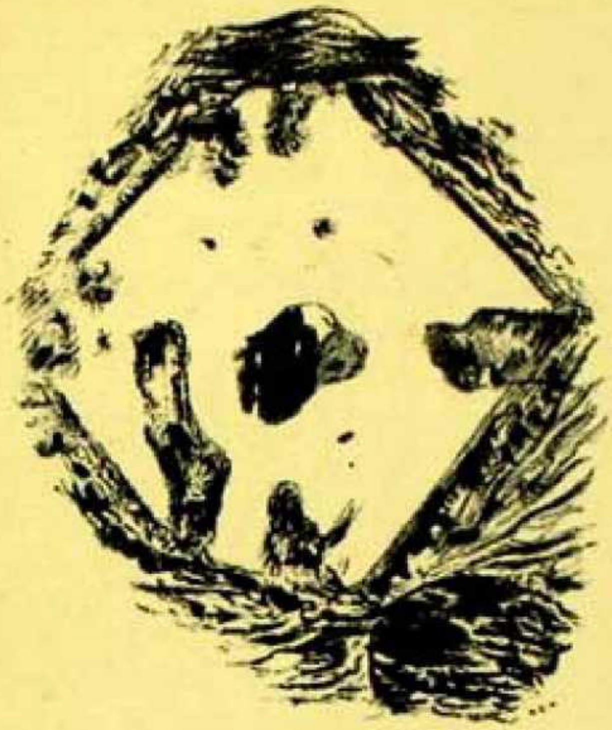

Fig: 1.

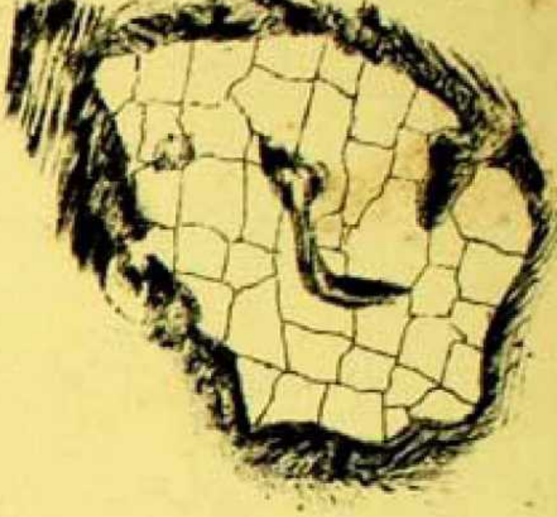

Fig: 2.

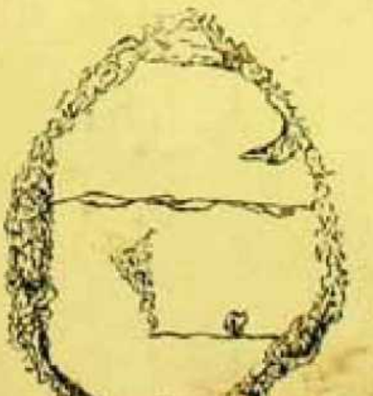

Fig: 3.

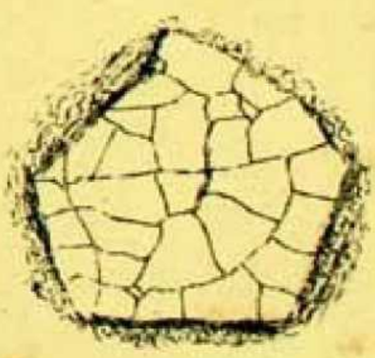

Fig: 4.

Quartz in Chinese Acid Rocks.

JOURNAL

OF THE

ASIATIC SOCIETY OF BENGAL.

Vol. LXII. Part II.—NATURAL SCIENCE.

No. IV.—1893.

Natural History Notes from H. M. Indian Marine Survey Steamer, 'Investigator,' Commander C. F. Oldham, R. N., Commanding. Series II., No. 9. *An Account of the Deep Sea Collection made during the Season of* 1892–93.—*By* A. Alcock, M.B., C.M.Z.S., *Superintendent of the Indian Museum.*

With plates VIII. and IX.

[Recd. Nov. 21. Read Decr. 6th.]

The collection here described is a very small one, but the few things obtained are interesting.

Among Coelenterata, *Cerianthus* and *Cyathohelia* do not appear to have been before recorded from the Bay of Bengal: among Echinoderma, *Astroschema* and *Echinolampas*—although the latter has been recorded as a Sind Tertiary fossil: and among fishes *Odontostomus.* All these occur in the present collection.

COELENTERATA.

NEMATOPHORA.

ANTHOZOA ACTINIOMORPHA.

ACTINIARIA.

Family **Ceriantheæ.**

Cerianthus, Delle Chiaje.

1. *Cerianthus tenebrarum*, n. sp.

Elegantly caryophyllaceous in shape.

The body wall is thick, and the characteristic investing sheath is loose. The oral sphincter is stout. The tentacles of the inner crown are short and number about fifty: those of the outer crown are very long with stout base and long wavy filamentous ending, and number about sixty. The septa with their mesenteric filaments are almost entirely confined to the upper third of the enteric cavity, leaving about the lower two-thirds as a perfectly smooth-walled chamber.

Colour dull madder, the tentacles being lighter and ruddier than the body.

Length, contracted in spirit, 50 mm.

With the exception of a species from the Andaman Reefs, described in J. A. S. B., Vol. LXII., Pt. II., 1893, p. 153, this seems to be the only *Cerianthus* hitherto recorded from India.

From the Bay of Bengal on a muddy bottom at 410 fathoms: bottom-temperature 45.5° Fahr.

MADREPORARIA APOROSA.

Family **Turbinolidæ.**

(1) *Flabellum laciniatum*, Phil., and (2) *Flabellum japonicum*, Moseley, appear to be quite common inhabitants of the muddy bottom of the Bay of Bengal at 400–700 fathoms. And among the corals obtained with them during the past year is a new species of *Rhizotrochus*.

Rhizotrochus, Edw. and Haime.

3. *Rhizotrochus crateriformis*, n. sp., Pl. VIII. figs. 1 and 2.

Corallum low, bowl-shaped, having a small central mamillary pedicular scar, a very thin fragile epithecate wall, and a regular, circular calicular orifice with the lip gently everted.

From the thecal wall, which is marked with close faint costal striæ and with close faint concentric lines of growth, the large cylindrical "rootlets" stand out at a wide angle.

The septa, which are in four complete cycles, with an incomplete fifth, are thin, and have their crests strongly emarginate, so that when the corallum is viewed from above they look something like large pali: their surface is marked with lines of distant, coarse granules, concentric with the curve of the crest. The septa of the first two cycles are approximately co-equal, and all unite at the very bottom of the calice by a few stout cylindrical trabeculæ which form a rudimentary columella: above this they do not encroach very greatly on the calicular space, but leave a clear wide central fossa. The septa of the third cycle are narrow laminæ, those of the fourth are still narrower, and those of the incomplete fifth are merely fine ridges in the upper part of the calicle.

Colour in spirit—both corallum and soft parts—quite white.

The tentacles, which appear to be about ninety in number, are disposed in three concentric series.

Greatest height 22 mm.: diameter of calicular orifice 32 mm.: depth of calicular fossa 16 mm.

From the Bay of Bengal on a muddy bottom at 573 fathoms: bottom-temperature 45·3° Fahr.

Family **Oculinidæ**.

CYATHOHELIA, Edw. and H.

4. *Cyathohelia axillaris* (Ell. and Sol.)

Madrepora axillaris, Ellis and Solander, Nat. Hist. of Zoophytes, p. 153, tab. 13, fig. 5.

Cyathohelia axillaris, Edw. and Haime, Coralliaires II. 110.

A branch of a colony answering to the figure in Ellis and Solander was dredged from a previously unknown coral bank in Lat. 14° 11′ 6″ N., Long. 80° 24′ E. [about 55 miles N. by E. of Madras) in 88 fathoms, bottom-temperature 65° Fahr.

MADREPORARIA POROSA.

Family **Eupsammidæ**.

DENDROPHYLLIA, Edw. and H.

5. *Dendrophyllia nigrescens*, Dana.

Dendrophyllia nigrescens, Dana, Zoophytes, p. 387, pl. 27 (30), fig. 1.

From the same coral bank, at the same depth, several branches of this species were dredged.

ANTHOZOA ALCYONIOMORPHA.

The coral bank in 88 fathoms, N. by E. of Madras, appears to be very rich in *Gorgonacea* and *Alcyonacea*. Unfortunately the dredgings were merely rough dried, without any treatment, so that they reached the Museum denuded and almost valueless. The following genera are recognized:—*Anthogorgia, Echinogorgia, Acis, Gorgonella, Juncella, Scirpearella; Spongodes.*

ECHINODERMA.

ASTEROIDEA.

Family **Archasteridæ**.

PSEUDARCHASTER, Sladen.

1. *Pseudarchaster mosaicus*, Alcock and Wood-Mason.

Pseudarchaster mosaicus, Alcock and Wood-Mason, Ann. and Mag. Nat. Hist., Dec. 1891, p. 432.

A specimen with a span of nearly 200 mm. from 599 fathoms off the Madras Coast.

Family **Astropectinidæ.**

Dipsacaster, gen. nov.

2. *Dipsacaster, pentagonalis*, n. sp.

Differs from *Dipsacaster sladeni* (Ann. Mag. Nat. Hist., February, 1893, p. 87, pl. V. figs 3 and 4) in the following particulars:—The disk is relatively larger, and the rays, which are bluntly rounded at the tip, are relatively shorter and broader—the whole form being thus more pentagonal; the relative length of the rays to the radius of the the disk is 2·5 : 1; the paxillæ are larger; on the adambulacral plates the central spine of the paxilliform group is a large distinct spine and not a mere spinelet. Two specimens from the Andaman Sea, 112 fathoms.

Family **Pentagonasteridæ.**

Calliaster, Gray.

3. *Calliaster mamillifer*, n. sp., Pl. VIII. figs. 3 and 4.

Rays 5 R = 2·5 to 3r.

Abactinal area covered with sunken circular plates, each bounded by a ring of discoid granules: the mid-radial plates of the disk bear each a great globular mammillated spinelet, as do also, but on a smaller scale, the dorso-central and basal inter-radial-plates.

The supero-marginal plates, which are six in number, excluding the terminal, and come in partial contact across the distal third of the rays, have the form of great globules, each surmounted centrally with a nipple-like spinelet: those in the outer third of the ray sometimes bear also one or two granules.

The infero-marginal plates coincide not quite exactly with their fellows of the supero-marginal series: they are long, broad and tumid, and each bears near the suture line with that series, a row or a group of large coarse truncated spinelets.

The adambulacral plates have each a furrow series of four radiating spinelets, and actinally a single large coarse truncated spine and rarely a few granules also.

The actinal inter-radial areas are of some size, with large and slightly tumid plates, many of which have one, or very rarely two, large coarse spinelets.

All the marginal, adambulacral, and actinal plates have much the same fringe of discoid granules or squames as the abactinal plates, only it is not so regular.

Anus subcentral.

Madreporite small, circular, radially striated, situated about midway between the margin and the centre.

Colour in spirit, chalky yellow. This singularly beautiful species was dredged in the Andaman Sea, between 270 and 245 fathoms.

Family **Zoroasteridæ**.

ZOROASTER Wyville Thomson.

Fine specimens of (4.) *Zoroaster Alfredi* and (5.) *Zoroaster barathri* (Ann. Mag. Nat. Hist., Feb. 1893, pp. 102, 103), from the Bay of Bengal, 599 fathoms.

OPHIUROIDEA.

Family **Astrophytidæ**.

ASTROSCHEMA, Örst. and Ltk.

1. *Astroschema flosculus*, n. sp., Pl. VIII. fig. 5.

R = 11r – 16r.

The sides and abactinal surface of the disk and arms are covered with granules,—prominent granules and globules being scattered over a finely granular surface, and the actinal surface is covered with an uniform microscopic granulation.

Viewed from the aboral aspect the disk is rotate-corolla-shaped, being deeply depressed in the centre and consisting of five deep cut petaloid lobes, each composed of a pair of radial plates. There are no mouth papillæ or tooth papillæ, but there is a vertical row of five large hastate teeth on each mouth segment.

Rays long, tapering to a lash, simple, and perfectly square in section, the actinal angles of the square being occupied by the series of paired spine-like tentacle scales, and the abactinal angles by series of prominent clumps of globuar granules corresponding to the tentacle scales, this arrangement emphasing the arm joints and giving the arms a regularly beaded appearance.

Genital openings nearly vertical, and traversing nearly the whole depth of the disk.

Mouth tentacles large, the second pair of tentacles without any scale, the third pair with the pairs of scales small.

Colour, in alcohol, grey; in life, blood-red.

From the newly discovered coral bank north of Madras, in 88 fathoms.

ECHINOIDEA.

SPATANGOIDA.

Family **Cassidulidæ**.

ECHINOLAMPAS, Gray.

1. *Echinolampas castanea*, n. sp., Pl. VIII. fig. 6.

Test thick, high, bluntly conical towards the greatly excentric abruptly subacuminate apical system; sub-pentagonal in tumid ambital outline; densely felted with short capillary spines, which are larger and sparser on the actinal surface, and at the tumid inter-radial peristomial margins form fan-like tufts.

Ambulacra equal, narrow, petaloid abactinally, the poriferous areas of unequal length in the same petal, approaching as if to close, and then again diverging, the pairs of pores set very close together in grooves separated by moniliform ridges: beyond the petals the ambulacra increase considerably in width to the ambitus, whence they taper to the peristome, while the pores become single, distant, and invisible to the naked eye as far as the vicinity of the peristome, where they are again large and double, and are crowded together to form distinct phyllodes.

Inter-radia large, constricted very abruptly at the apical system and gradually at the peristome, being represented at the peristomial margin by a single tumid granular plate.

Both ambulacral and interradial plates closely covered with small scrobiculate tubercles of uniform size and disposition, except in the middle of the actinal surface, where they become a little larger and much more scattered: fine miliary granulation between the tubercles.

Apical system small, very excentric in front: a large central madreporite extending from the right anterior basal: four genital pores.

Peristome situated in the middle of a distinct hollow, excentric in front, transverse, pentagonal, with a distinct floscelle.

Periproct in posterior inter-radium, large, elliptical, transverse, immediately inframarginal, with a valvular operculum formed of three large tuberculated plates.

Colour, yellowish green.

Bay of Bengal, 11 fathoms.

At first sight this species has a strong resemblance to *Echinolampas spheroidalis*, d'Arch and Haime, from the Miocene of Sind and Kuchh; from which it is distinguished at once by the concavity of the actinal surface and by the tumid peristomial margin. The test is also higher in the present species.

Family **Spatangidæ.**

BRISSOPSIS, Ag.

2. *Brissopsis Oldhami*, n. sp., Pl. VIII. figs. 7 and 8.

Test thin, inflated, ovoid, with a faint anterior groove and a strong posterior truncation; abactinally covered with recurved hair-like spines which are largest and densest within the peripetalous fasciole; actinally with similar large spines in the interradii, the ambulacra being almost naked.

All the ambulacra are abactinally petaloid and sunken: in the anterior petal, which is the longest and narrowest, the pores are small and extremely evenly and closely set, in the other petals the pores are large: beyond the petals the ambulacra are only slightly spiniferous at the ambitus, and are almost or quite naked actinally; and all have small and distant pores; but abactinally the plates of the postero-lateral ambulacra are spiniferous, and the pores of those that are enclosed in the sub-anal fasciole are exceptionally large. Abactinally, as actinally, the inter-radii are very large, with big broad plates that are finely and closely granular abactinally and much more coarsely and distantly granular actinally.

Peristome reniform: the orifice of the mouth is made valvular by the remarkable prolongation forwards of the labrum.

Apical system hardly excentric; the madreporite is large, passing backwards from the right anterior basal and separating the posterior basals and radials and several inter-radial plates; four large genital pores.

Periproct small, vertically pyriform, high up in the posterior truncation, with many plates, of which those at the circumference are the largest.

The peripetalous fasciole is very distinct, being broadest posteriorly. Sub-anal fasciole reniform, largely actinal in position, being far distant from the periproct. Two narrow and inconspicuous fasciolar bands extend up from the sub-anal fasciole, one on each side, to the level of the periproct and are then gradually lost.

The pedicels of the anterior petal are of conspicuous length.

Colour, dull olive-green; fascioles dull madder brown.

Bay of Bengal, 753 fathoms, bottom soft mud; bottom temperature 41·2° fahr.

Lovenia, Ag. and Desor.

3. *Lovenia gregalis*, n. sp., Pl. VIII. fig. 9.

Test thin, broad, flat, cordiform, grooved and deeply excised anteriorly, broadly truncate posteriorly, the ambital margin in front sharp, behind gently rounded. Spinature scanty.

Anterior ambulacrum in the groove, with pores small and inconspicuous except at the peristome, where they are larger: it is practically unmodified throughout its course, from apex to peristome. Lateral petaloid ambulacra with pores almost invisible to the naked eye within the internal fasciole: beyond the internal fasciole the antero-lateral petals are markedly divergent from, while the postero-lateral petals are convergent towards, the sagittal line: the slightly sunken pairs of pores are large and are separated from one another by faint ridges with minute distant granulation, the interporiferous space is broad and bears several series of granules. Beyond the petals the postero-lateral ambulacra increase greatly, while the antero-lateral decrease somewhat in width.

Inter-radii very large and broad abactinally where the antero-lateral bear each a small patch, and the postero-lateral each a much larger patch, of large deeply scrobiculate perforated tubercles, each surmounted by a long slender recurved recumbent hollow spine. Similar but smaller tubercles, with similar spines, cover the actinal surface rather more densely throughout almost the whole of the broad antero-lateral and postero-lateral inter-radii, and also occur in two small patches, involving both ambulacral and posterior inter-radial plates, in each wing of the sub-anal fasciole.

Peristome situated immediately behind the anterior cleft, semilunar in shape, and followed by a long narrow labrum.

Apical system hardly excentric; the madreporite in the posterior basal.

Periproct in the upper part of the posterior truncation, large, transversely oval, not sunken.

The internal fasciole is remarkable in not crossing the anterior ambulacrum; after skirting the groove in rather more than half of its extent, it gradually fades away on either side, sometimes bending slightly towards the groove, as if to cross, sometimes not. The subanal fasciole is large and dumb-bell shaped, and encloses three pairs of pores on either side.

Colours: brownish green, spines white.

Bay of Bengal, 475 fathoms, bottom brown ooze, bottom temperature 45·5° Fahr.

MOLLUSCA.

The Mollusca that we may now regard as characteristic of the hundred-fathom line in the Bay, were again met with in considerable numbers, namely, *Rostellaria delicatula*, Nevill, *Sigaretus* sp., *Tellina* sp., and *Nucula* sp. At about the same depth (128 fathoms) there were dredged *Phos* sp., *Pleurotoma* sp. prox. *atractoides*, Watson, and *Tellina* sp. prox. *Murrayi*, E. A. Smith, and on the coral bank, at 88 fathoms, *Murex palmarosæ*, Lmk.

ARTHROPODA.

CRUSTACEA.

DECAPODA.

At 128 fathoms the Penæid (1.) *Solenocera Hextii*, Wood-Mason, characteristic of that depth here, was dredged.

Of the other crustacea taken, three appear to be new to the Indian record. They are as follows:—

Family **Trapeziidæ.**

QUADRELLA, Dana.

2. *Quadrella coronata*, Dana.

Quadrella coronata, Dana, U. S. Expl. Exped., Crust, Pt. I. p. 266, Pl. XVI. figs. 5 a–d.

A single female.

From the Coral Bank north of Madras, 88 fathoms.

Family **Parthenopidæ.**

PARTHENOPE, Fabr.

3. *Parthenope spinosissima*, A. M.-Edw.

Parthenope spinosissima, A.M.-Edw., Notes sur L' Ile de la Réunion Annexe F., p. 8, Pl. XVII;

A large ovigerous female and a small male.

Colour in life reported to be blood-red.

From the Coral Bank north of Madras, 88 fathoms.

Family **Raninidæ.**

RANINOIDES, Milne-Edwards.

4. *Raninoides personatus*, White MS., Henderson.

Raninoides personatus, Henderson, Challenger Anomura, p. 27, Pl. II. fig. 5.

Numerous specimens from the Bay of Bengal, 31 fathoms.

Family **Homolidæ.**

HYPSOPHRYS, Wood-Mason.

5. *Hypsophrys superciliosa*, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p 269.

Several beautiful specimens, both males and ovigerous females, from the Laccadive Sea, 865 fathoms, bottom *Globigerina* ooze, bottom temperature 40° Fahr.

VERTEBRATA.

PISCES.

ACANTHOPTERYGII.

Family, **Trachinidæ.**

Group Trachinina.

BATHYPERCIS, n. gen.

Head large, depressed; body cylindrical, elongate. Cleft of the mouth wide, oblique, with the lower jaw projecting; villiform teeth in jaws, vomer, and palatines. Eyes large, supero-lateral. Gill-cleft wide; seven branchiostegals; preoperculum armed; four gills; pseudobranchiæ large. Scales ctenoid; lateral line continuous from occiput to caudal fin, its anterior portion armed. Two separate dorsal fins, the first short, the second long, and equal opposite and similar to the anal. Ventrals jugular.

No air-bladder; no pyloric cæca.

1. *Bathypercis platyrhynchus*, n. sp., Pl. IX fig. 1.

General aspect Platycephaloid, with some superficial resemblances to *Callionymus*.

B. 7. D. 6/14. A. 16. C. 12, with numerous rudimentary rays at base. P. circ. 25. V. 1/5. L. lat., from origin on occiput, 50. L. tr., 11.

Head large, broad, depressed, its extreme length, measured from the tip of the projecting mandible to the apex of the prolonged opercular flap is not much less than half the total, caudal excluded. Body elongate, cylindrical, low, and tapering to the large caudal.

The snout is broad, much depressed, and spathulate, resembling the bill of *Bathypterois*; its extreme length is equal to the major diameter of the orbit, and rather over one-fourth the extreme length of the head. Mouth-cleft wide, slightly oblique, the maxilla reaching nearly to the vertical through the middle of the eye, and ending in a fleshy barbel. Teeth in villiform bands on the jaws, vomer, and palatines. Tongue large, spathulate.

The large eyes are placed close together on the summit of the head, separated from each other by a narrow groove; but the visual axis is lateral. The gill-cleft is very wide, the gill-membranes being free of the isthmus throughout: the preopercular angle is spinate, and the operculum, which is prolonged in membrane nearly to the level of the 4th dorsal spine, has two spines above and one below. Four gills with setiform gill-rakers and broad laminæ: pseudobranchiæ large.

The body, and the head and the snout above, are covered with rather large finely ctenoid scales. The lateral line, beginning on the occiput as a close-set row of re-curved spines, or strongly carinated scales, curves inwards towards the first dorsal fin and then downwards along the lower half of the tail, being salient but unarmed in this part of its course.

The first dorsal fin is short, and is separated from the second by four or five rows of scales: the second, which is much more elevated than the first, extends from the level of the vent to within an eye-length of the base of the caudal. The anal fin is similar to the second dorsal. The pectorals are large and long, reaching to the fourth anal ray. The ventrals are jugular, arising an eye-length in advance of the pectorals: their plane of origin is horizontal, and they reach considerably beyond the scaly bases of the pectorals.

Stomach siphonal with a large cæcal sack. No pyloric cæca. No air-bladder.

Colours in spirit, yellowish-brown, with thirteen incomplete and indefinite darker cross-bands on body and tail: a golden-green ocellus on crown of head and in the apex of each opercular flap: spinous dorsal white at base, black in the upper half; second dorsal with dusky bands: caudal and pectorals dusky: anal and ventrals hyaline. Length 4·3 inches.

Bay of Bengal, 128 fathoms.

Family, **Pediculati.**

Lophius, Art.

2. *Lophius mutilus*, n. sp.

This species is distinguished from all its fellows by the structure of the second part of the spinous dorsal fin, which is rudimentary.

B. 5. D. 3/ (2)/ 8. A. 5. C. 8. P. 15. V. 1/5.

Cephalic disk enormous, its width nearly equal to its length, which is not much less than half the total, including the caudal.

The head bones are marked by spinate crests, one small and bifid at the pre-orbital angle; one large and tridentate above each orbit; one at the upper limit of the clavicle, one large and trifid at the angle of the clavicle, and two on the preoperculum—besides numerous ridges ending in acute points.

The eyes are large, their major diameter being nearly one-fifth the length of the head.

The mouth-cleft involves the whole breadth of the cephalic disk. Small depressible fangs of unequal size in three irregular series in the mandible, in two series at the pre-maxilliary symphysis, but in a single series along the greater extent of the pre-maxilla: a pair of rigid fangs on each side of the vomer: an uneven row of five or six rigid fangs along each palatine. Gill-cleft relatively wide: three gills.

Head and body covered with loose glandular skin, which forms a row of filaments along the edge of the cephalic disk and along the sides of the tail.

Dorsal spines in the form of plain setæ, the first two of which have the usual position close together on the snout, while the third, which is as long as the cephalic disk and nearly twice as long as the second, arises behind the orbit. The second portion of the spinous dorsal is represented by two distant rudimentary rays only visible by dissection. The soft dorsal, and all the other fins have the usual position.

Colours in spirit, mottled brown, tip of tongue dusky. Length 5·25 inches.

Bay of Bengal, 128 fathoms.

ANACANTHINI.

Family, **Gadidæ.**

PHYSICULUS, Kaup.

3. *Physiculus argyropastus*, n. sp., Pl. IX. fig. 2.

B. 7. D. 8-9/55. A. 57. V. 6.

Head large, broad, depressed, its length a good deal more than one-fourth of the total, caudal included. Height of the compressed body from about half to eleven-nineteenths the length of the head. Snout broad, depressed, rounded, its length equal to the width of the interorbital space and just exceeding the major diameter of the eye. Mouth wide, oblique, with the upper jaw overhanging; the maxilla reaches behind the vertical through the middle of the orbit; broadish bands of villiform teeth in the jaws only. Barbel filiform and inconspicuous, its length not half that of the eye. Gill-openings extremely wide, free from the isthmus throughout: four gills. with about eleven spathulate gill-rakers. Pseudobranchiæ glandular. Body and head invested with small thin deciduous cycloid scales, of which there are six rows between the first dorsal fin and the lateral line.

The first dorsal, which is separated from the second only by a notch, begins in the vertical through the origin of the pectorals; its height is about equal to the length of its base, which is considerably less than one-third that of the head: the second dorsal extends to within an eye-length of the caudal, and its rays, posteriorly especially, are longer than those of the first. The anal begins almost in the vertical through the base of the pectoral, the vent being situated forwards in the vertical through the posterior edge of the operculum. The pectorals are long and pointed, the upper rays reaching to the twelfth or fourteenth anal ray, and being as long as the head behind the middle of the eye. The ventrals arise on narrow horizontal bases: the second ray is nearly as long as the head. There is a post-anal papilla, and a pre-anal pigmented pit, as in *Physiculus roseus*.

The margin of the large thick-walled air-bladdder is pectinately lobed somewhat as in Sciænoids. Colour in spirit, light pinkish brown, with a silvery sheen; belly, throat, and gill-membranes black.

Bay of Bengal, 128 fathoms.

The largest specimen, an adult female, is 9 inches long.

BREGMACEROS, Thompson.

4. *Bregmaceros MacClellandii*, Thomps.

A fine specimen from the Bay of Bengal in 128 fathoms.

The small and immature specimens dredged in previous years at and near this depth, probably belong to this species.

Family, **Ophidiidæ.**

NEOBYTHITES, Goode and Bean.

5. *Neobythites steatiticus*, n. sp., Pl. IX Fig 3.

B. 8. D. circ. 85. A circ. 65. C. 8. P. circ. 22. V. 2.

The large heavy head is in length about one-fourth of the total, caudal included, and is armed with a large opercular spine. The snout, which is bluntly pointed and overhangs the mouth, is in length equal to the diameter of the eye, or between a fifth and a sixth the length of the head. The eyes are large and prominent, without any orbital fold: they are a little over a diameter apart. The nostrils are large, the anterior being a small tube near the tip of the snout, the posterior being a large foramen at the angle of the eye.

The mouth is large, the maxillary extending far behind the posterior border of the orbit, and being nearly half of the head in length.

Teeth viliform, in narrow bands in the jaws, vomer, and palatines.

Gill-cleft very wide, the gill-membranes being separate throughout. Four gills, with broad laminæ and close-set gill-rakers, which are long in the middle of the first arch.

Each pseudobranch consists of two pinnules only. The head, body, and base of the dorsal and pectoral fins are covered with small, moderately adherent scales, of which there are about nine rows between the first dorsal ray and the lateral line, and about twenty-one rows between the lateral line and the vent. The vertical fins have long delicate rays, which are completely invested in loose skin: the dorsal begins well in advance of the base of the pectoral, and the anal on a level with the tip of the latter, both being confluent with the caudal at its base.

Pectorals with large fleshy scaly base: the ventrals arise on the pectoral symphysis, and consist of two long filaments fused together in their basal half.

Stomach siphonal; intestine much coiled; about eight or nine minute rudimentary pyloric cæca encircle the pylorus.

Colour in spirit, creamy yellow clouded and marbled with shades of light brown which forms four ill-defined cross-bands, all of them involving the dorsal fin: a large oval ocellus, formed of a black centre in a broad creamy white ring, on the dorsal fin between the 20th and 30th rays or a little beyond: anal jet black with a milk-white border.

Length of type 5·25 inches.

Bay of Bengal, 128 fathoms.

PHYSOSTOMI.

Family, **Scopelidæ**.

ODONTOSTOMUS, Cocco.

6. *Odontostomus atratus*, n. sp., Pl. IX Fig. 4.

The extreme length of the square, high, compressed head is a little more, and the greatest height of the compressed tapering body is a little less, than one-fourth of the total, caudal included.

The snout has the form of a pointed wart beyond which the upper jaw projects, the lower jaw again projecting beyond the upper.

The eyes, which are situated about a diameter apart, near the top of the head, have their major diameter obliquely vertical, and are capable of such strong rotation inwards as to bring the visual axis obliquely upwards, the orbit being walled in laterally by a stout but transparent fold of skin in its lower half.

The cleft of the mouth extends almost to the posterior edge of the operculum: the premaxillæ are armed with a series of close uniform serrations for the most part pointing forwards, the vomer bears on each side a sabre-shaped depressible fang nearly half as long as the head, the palatines have each an exactly similar fang succeeded by a row of close serrations, and the mandible has on each side a distant series of similar fangs of unequal size, the largest of them however being hardly half the length of those on the vomer and palatines.

Gill-cleft extremely wide and high: four gills with wide laminæ and gill-rakers inconspicuous or absent: pseudobranchiæ large.

Body covered with a glandular scaleless skin in which the lateral line appears in spirit as a white streak. Rows of white dots (luminous organs?) exist along the free border of the preoperculum and the inner border of the broad boat-shaped mandible.

The dorsal fin lies altogether within the anterior half of the body: the anal begins about half a head length behind the vertical through the last dorsal ray, and extends to the rudimentary basal rays of the forked caudal. The large pectorals arise close to the ventral profile, almost in the same plane with the ventrals, the bases of which they touch when laid back. The ventrals arise under the middle of the dorsal.

Colour in spirit, jet black.

Length 3·5 inches.

Bay of Bengal, 573 fathoms.

Family **Murænidæ**.

CONGROMURÆNA, Kaup.

7. *Congromuræna squaliceps*, n. sp., allied to *C. megastoma*. Gthr. and *C. longicauda*, Alcock.

Head about an eye-length longer than the trunk, which is not quite one-fourth the length of the tail. The snout, which projects far beyond the mouth, is a little more than one-fifth the head in length. The major diameter of the very elliptical eye is not quite two-thirds of the length of the snout. The anterior nostril is a short wide tube situated on the lip near the end of the snout, the posterior is a wide foramen situated in advance of and above the angle of the eye. The mouth-cleft is wide, extending almost to the vertical through the posterior border of the orbit, and the lips are greatly developed: the minute teeth are in bands in the jaws, and in a broad rasp-like patch outside the mouth in the premaxillary; there are a few teeth on the vomer quite anteriorly. Gill-openings comparatively wide, separate. No scales: lateral line with small pores. Pectorals narrow, half an eye-length longer than the snout. Vertical fins confluent, the dorsal beginning nearly an eye-length in advance of the gill-opening.

Colour in spirit, grey, the vertical fins in their after half to two-thirds with a black edge, which in the anal tends to involve the whole fin. A very large air-bladder extending half a head-length beyond the vent. Visceral peritoneum silvery. A sexually mature male 15 inches long from the Bay of Bengal, 128 fathoms.

8. *Congromuræna nasica*, n. sp. Allied to the preceding group.

Head depressed, an eye-length longer than the trunk, which is much more than a-fourth the length of the tail (1 : about 3·4).

The snout, which projects beyond the mouth, is a fourth the length of the head and nearly twice the major diameter of the eye. The nostrils are as in the preceding species.

The mouth cleft extends almost to the vertical through the posterior border of the orbit. The teeth are in two bands in each jaw, an inner band of minute teeth, and an outer broader band of larger teeth: the premaxillary teeth are in bands outside of the closed mouth, and the vomerine teeth are in a single row along the anterior fourth of the bone.

Gill-openings comparatively wide, separate. No scales: lateral line with minute pores. Pectorals narrow, equal to the snout in length. Vertical fins confluent, the dorsal beginning over the gill-opening.

Colour in spirit gray, the vertical fins in their after third to fourth with a much narrower black edge. Visceral peritoneum black.

Two nearly mature females 10 inches long, and two young from the Bay of Bengal, 128 fathoms. The differences between this species and the preceding are too numerous to support the opinion that they are only different sexes of the same species.

At the same station a specimen of (9.) *Dysomma bucephalus* was dredged.

On some Indian Species of Canarium.—By GEORGE KING, M. B., LL. D., F.R.S., C.I.E. *Superintendent of the Royal Botanic Garden, Calcutta.*

With Plates X, XI, XII, and XIII.

[Read—December 6th]

In Sir Joseph Hooker's Flora of British India eighteen species of *Canarium* are described. Of these, twelve are Indo-Malayan, two have hitherto been collected only in the Andaman Islands, and two are confined to Ceylon. The remaining two, *viz.*, *C. strictum*, Roxb., and *C. bengalense*, Roxb. are natives of British India proper, and were both originally published by Roxburgh in his Flora Indica. *C. strictum* is a native of Southern India, and was originally described from specimens received by Roxburgh from the Forests of the Tinnivelli district in the extreme South of the Peninsula. It has since been collected in the Anamalli and Bababudin Hills, in the Concan, and in other parts of the Forests of the Western Ghats. *C. bengalense*, on the other hand, is known only from Sylhet and Assam. The distribution of the two species is therefore very different. All the species of *Canarium* known to me are large trees with tall clear stems, bearing branches, (and consequently flower and fruit), only at their apices. Botanical specimens are therefore not easily obtained, and the various species are poorly represented in most collections, and are therefore but imperfectly understood by Botanists. The species indigenous to British India proper do not in these respects form any exception; for, in spite of the existence for the last five and twenty years of a large and well-organised Forest Department, we do not appear to know more to-day about them than we did when Roxburgh originally described two of them eighty years ago. With the view of directing the attention of forest officers to their study, I venture to submit to the Society descriptions of the two already recognised Indian species, a description of what appears to me to be a new species from Sikkim, and some notes on specimens which appear to belong to two species hitherto unrecognised and undescribed.

CANARIUM, Linn.

Tall reziniferous trees. Leaves alternate, unequally pinnate, stipulate or exstipulate. *Flowers* bracteate, in panicles or racemes, dimorphous, those with fertile stamens and rudimentary ovaries being smaller but in larger inflorescences, those with fertile ovaries and rudimentary stamens being larger but in smaller inflorescences. *Calyx* campanulate, with 3 valvate lobes or teeth. *Petals* 3, imbricate, longer than the calyx. *Stamens* 6, the filaments united in their lower part to form a tube. *Ovary* 3-celled, ovules 2 in each cell. *Style* cylindric, or stigma subsessile and capitate. *Drupe* ellipsoid, more or less distinctly trigonous, with a 1–3-celled, 1–3-seeded, stone; cotyledons often partite.*

1. C. BENGALENSE, Roxb. Hort. Beng. 49: Fl. Ind. III., 136. Young branches glabrous. *Leaves* 1 to 2 feet long (in young trees considerably more); leaflets 11 to 21, oblong-lanceolate to ovate-oblong, entire, acute, or very shortly acuminate, the base rounded or slightly narrowed; both surfaces glabrous; the main nerves 10 to 20 pairs, sub-horizontal, curving at their tips, distinct on the lower surface when dry; length 3 to 7 in., breadth 1·25 to 2·5 in.; stipules subulate, pubescent, deciduous. *Inflorescence* glabrous as to the rachises, the pedicels of the flowers puberulous; the male flowers in racemose panicles, the lateral branches of which are pedunculate few-flowered rather lax cymules. *Calyx* about one-third of the length of the corolla, campanulate, its mouth with 3 shallow broad teeth. *Petals* coriaceous, oblong, concave, glabrous. *Staminal-tube* about the same length as the free part of the filaments and anthers; free part of filament slightly shorter than the narrowly ovate anthers. *Disc* none; rudimentary ovary depressed, deeply lobed, hispid at the apex. *Female flower* (fide Roxburgh) like the male; the ovary ovoid, tapering gradually into the style, the stigma 3-cleft. *Ripe drupe* oblong; the style sub-persistent, tapering to each end, smooth, 1·5 to 1·75 in. long and ·7 to ·8 in. in diam. Hook. fil. Fl. Br. Ind. I, 534; Engler in DC. Monog. Phan. IV, 118.

Assam and Sylhet; Griffith No. 1144. (Kew Distrib.), Simons, S. E. Peal, Mann.

A tall tree like *C. strictum* but, unlike that species, almost entirely glabrous, and having leaves with smaller and more numerous leaflets. According to Mr. S. E. Peal, who has resided and observed in Assam for five and twenty years, its vernacular name in the Sibsagar district of that province is *Neribi*. From wounds in the bark a clear amber-like rezin exudes which is used for a variety of purposes, but chiefly to be burnt as incense.

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* There is no true disc in any of the species here described. What some writers refer to as a disc is merely the tube formed by the union of the dilated lower part of the filaments.

Plate X, *C. bengalense*, Roxb.—1. Two leaflets. 2. inflorescence. 3. ripe fruit; *of natural size.* 4. calyx. 5, 6, 7. petals. 8. staminal column. 9. rudimentary ovary; *enlarged.* 10. two stamens; *much enlarged.*

2. C. STRICTUM, Roxb. Hort. Beng. 49: Fl. Ind. III, 138. Young branches rufous-tomentose. *Leaves* 1 to 1½ feet long (in young trees up to even 4 feet); leaflets 7 to 9, ovate to elliptic, minutely serrate or crenulate when young, entire or sub-entire when adult, shortly acuminate, the base rounded or slightly cordate and sometimes sub-oblique; when young tomentose on both surfaces; when adult the upper surface glabrous and shining, the lower more or less tomentose with the 11 to 16 pairs of spreading rather straight main nerves bold and prominent and the intermediate nerves distinct and parallel; length 3 to 6 in., breadth 1·5 to 2·5 in., petiolule ·25 or ·3 in., that of the terminal leaflet two or three times as long. *Inflorescence* more or less deciduously rusty-tomentose, that of the staminiferous flowers a narrow racemose panicle 6 to 9 in. long, its lateral branches being shortly peduncled few-flowered cymes. *Male* flowers ·35 in. long. *Calyx* tubular, with 3 shallow, broad, sub-acute teeth. *Petals* coriaceous, oblong, concave and pubescent outside in the upper two-thirds, glabrous inside. *Staminal tube* equal in length to the free part of the filaments and the anthers; free part of the filaments dilated towards the base, half as long as the ovate apiculate anthers. *Disc* none. *Rudimentary ovary* short, depressed, lobed, hispid. *Female flowers* ·5 in. long, in few-flowered racemes 4 or 5 inches long. *Calyx* wider than in the male. *Staminal tube* also as in the male, but shorter and the anthers with little or no pollen. *Ovary* ovoid-cylindric, tapering into the short thick style; stigma conical. *Ripe drupe* ellipsoid, tapering more to the apex than to the base, slightly trigonous, glabrous, 1·5 in. long, and ·75 in diam. Wight and Arnot Prodrom., 175: Dalz. and Gibs. Fl. Bombay, 52: Beddome Fl. Sylvat. I, t. 128; Hooker Fl. Br. Ind. I, 534; Engler in DC. Monog. Phan. IV, 118. *Pimela stricta*, Blume Mus. Bot. Lugd. Bat. I, 226.

Peninsular India, in the moist Forests of the Western Ghats up to elevations of 4,000 to 4,500 feet.

A very tall tree, the young leaves of a beautiful red colour, those of young trees or of young shoots of old trees being much larger than the measurements given above. According to Col. Beddome, the flowers have occasionally 4 petals and 8 stamens. The tree is known to Europeans in Southern India (Beddome Fl. Sylv., 128) as "black dammar." Its Tamil name, says the same authority, is *Karapu Kungi-*

liam; but it is also known as *Googal* and *Dhup*, two words which in the Eastern Himalaya are conjoined as the name of the species which I below name *C. sikkimensis.* In S. Canara *C. strictum* is known as *Manda Dhup.* The rezin, which is obtained by the barbarous and destructive method of cutting gashes in the lower part of the stem and then setting it on fire, is an article of trade in Southern India. It is used in the manufacture of bottling-wax, varnishes, &c., and is known by a variety of names of which the commonest are *Dhup, Googal*, and *Black dammar.*

Plate XI, *Canarium strictum*, Roxb.—1 and 2. leaflets. 3. inflorescence of male flowers. 4. inflorescence of female flowers. 14. drupe; *of natural size.* 5. calyx of male flower. 6. the three petals of the same. 7. side view of a petal. 8. staminal tube laid open. 12 and 13, pistils; *enlarged*, 10 and 11. front and back view of stamens; *much enlarged.*

3. C. SIKKIMENSE, King, n. sp. Young branches very thick and (like the petioles, petiolules, and under surfaces of leaves) densely rusty-tomentose. *Leaves* 15 to 13 inches long; leaflets ovate or elliptic to oblong, minutely crenate-serrate, shortly acuminate, the base rounded or emarginate, slightly oblique; upper surface (when adult) glabrous, shining; the lower softly tomentose, the 13 to 20 pairs of spreading, rather straight main nerves bold and prominent; length 4 to 7·5 in., breadth 2 to 3·5 in., petiole ·1 to ·25 in. *Male inflorescence* a racemose panicle 9 to 15 in. long, the lateral branches being shortly-stalked few-flowered cymes. *Flowers* ·3 in. long. *Calyx* tomentose outside, glabrous inside, campanulate, cut for one-third of its length into 3 broad, obtuse teeth. *Petals* twice as long as the calyx, oblong, obovate, coriaceous, concave and pubescent externally in the upper two-thirds, glabrous within. *Staminal tube* about half as long as the free part of the filaments and anthers, puberulous inside; free part of the filament nearly as long as the linear-ovate anther. *Rudimentary ovary* depressed, hirsute, lobed. *Disc* none. *Female flowers* unknown. *Ripe drupe* narrowly cylindric, ellipsoid, slightly obovoid, glabrous, sub-trigonous, 1·75 in. long and ·7 in. in diam. *C. bengalense*, (not of Roxb.) Gamble List of Trees of Darjeeling District, 15.

Sikkim, in tropical valleys at elevations of from 1,000 to 3,000 feet.

This is named *Googal Dhup* by the Nepalese, and *Nar-ok-pa* by the Lepchas. It is a very tall tree, and was once very common on the lower hill-forests; but now, alas! it is rare. According to Mr. Gamble (l. c. 15) the wood is white, open-grained and soft, with large medullary rays, and has a low specific gravity. It yields a rezin which is burnt as incense by the Lepchas This much resembles the Southern Indian *C.*

strictum, Roxb., but differs in having broader leaflets more tomentose beneath, a narrower drupe, and shorter branchlets.

Plate XII. *Canarium sikkimense*, King. 1. Leaflet. 2. inflorescence of male flowers. 3. ripe drupe; *of natural size*. 4. calyx. 5,6, & 7. petals, 8. staminal tube. 9. rudimentary ovary; *enlarged*. 10. stamens; *much enlarged.*

Besides the foregoing species, of which pretty full materials exist in the Calcutta Herbarium, there are imperfect materials of another species from Assam, *viz* :—

C. REZINIFERUM, Brace MSS. in Herb. Calc. A large tree 6 or 8 feet in girth, with leaflets resembling those of *C. sikkimense* in shape and size, but having their under surfaces covered with much less and much minuter tomentum, and with the rachises on which they are inserted almost glabrous. The *male inflorescence* is a panicle of cymes 12 to 16 in. long, the *female inflorescence* being racemose and only half as long, and both being rufous-puberulous. *Drupe* ovoid, 1·5 in. long, and nearly 1 in. in diam. when ripe, glabrous. Male and female flowers unknown. Assam and Khasia Hills, G. Mann.

This is the *Dhoona*, or *Dhua*, tree of Assam, and is a species apparently well enough known by its vernacular name and probably common in that province. It yields a rezin which is used to make torches. Fruiting specimens of it were collected by Mr. Gustav Mann at Nangpoo and at other places in the Khasia Hills. Male inflorescences with a few worm-eaten flowers accompany other specimens sent to the Calcutta herbarium by the same indefatigable collector. Leaf-specimens collected at Jota Bhor (near Jorhat) in the year 1845 by Mr. Masters, (a collector sent from the Garden,) also exist in the Calcutta Herbarium. But perfect specimens of flowers of both kinds are still wanting. Will no Forest officer now collect them ?

Plate XIII. *C. reziniferum*, Brace. 1. Leaflet. 2 inflorescence of male flowers. 3. ripe fruit; *of natural size*. 4. calyx. 5,6, & 7. petals. 8. staminal tube. 9. rudimentary ovary; *enlarged*. 10. two anthers; *much enlarged.*

There also exist in the Calcutta Herbarium specimens in fruit of a species from Arakan with glabrous oblong leaflets 6 or 7 inches long and about 3 inches broad, with minutely serrate edges, acuminate apices and broad emarginate bases, and drupes like those of *C. strictum*, Roxb. The nearest allies of this are apparently (1) *C. bengalense*, which has however smaller leaflets and much narrower drupes; and (2) *C. euphyllum*, Kurz, a species of which the drupe is as yet unknown.

Materials for a Flora of the Malayan Peninsula—*By* George King, M. B., LL. D., F.R.S., C.I.E., *Superintendent of the Royal Botanic Garden, Calcutta.*

No. 6.

Order XX. LINEÆ.

Herbs or shrubs. *Leaves* usually alternate, simple, entire, rarely crenate-serrate; stipules lateral or intrapetiolar or 0. *Inflorescence* various. *Flowers* regular, bisexual. *Sepals* 5, rarely 4, free or connate below, imbricate. *Petals* as many, hypogynous or slightly perigynous, usually fugacious, often contorted. *Stamens* 4–5, with as many interposed staminodes, or 8–10, (rarely more) filaments united at the base into a hypogynous or slightly perigynous ring, filiform; anthers versatile, 2-celled. *Glands* 5, entire or 2-lobed, usually adnate to the staminal ring, or obsolete. *Ovary* entire, 3–5 celled; styles 3–5, free or more or less connate, stigmas terminal; ovules 1 or 2, inserted in the inner angle of the cells, anatropous, pendulous. *Fruit* usually splitting into 3–5 cocci, rarely a drupe. *Seeds* 1–2 in each cell, testa sometimes winged, albumen fleshy or 0; embryo nearly as long as the seed, straight, rarely incurved, cotyledons broad, radicle superior.—Distrib. All regions; genera 14, species about 145.

Petals contorted, fugaceous; perfect stamens 2 or 3 times as many as the petals. Fruit drupaceous. Scandent herbs with hooked lateral branchlets	1 *Roucheria.*
Petals imbricate, with scales on their inner faces, ultimately deciduous; perfect stamens twice as many as the petals. Fruit drupaceous. Shrubs or trees	2 *Erythroxylon.*
Petals contorted, persistent; stamens 2 to 4 times as many as the petals. Fruit capsular, septicidal	3 *Ixonanthes.*

1. Roucheria, Planch.

Erect or climbing trees or shrubs with revolute woody tendrils. *Leaves* quite entire or glandular-serrate, coriaceous, penninerved; stipules minute, caducous. *Flowers* axillary, yellow, subsessile, or in excessively short fascicled spikes; pedicels bracteolate. *Sepals* 5. *Petals* 5, hypogynous, contorted, fugacious. *Stamens* 10, all fertile, filaments connate into a short tube below. *Glands* obsolete. *Ovary* 3–5-celled, styles 3–5, filiform, stigmas cuneate, 2-lobed; ovules 2, collateral. *Drupe* scarcely fleshy, subglobose; stone 3–6-angled, bony, cells 1-2-seeded. *Seeds* compressed, pendulous; albumen rather fleshy, embryo with foliaceous cotyledons and an elongate radicle.—DISTRIB. 3 or 4 species, one or more Malayan and 2 from Guiana.

1. ROUCHERIA GRIFFITHIANA, Planch. in Hook. Journ. Bot. VI, 143: VII, 527. A glabrous climbing shrub with hooked lateral branchlets. *Leaves* alternate, lanceolate, oblanceolate or elliptic-lanceolate, rather bluntly caudate-acuminate, obscurely crenate-serrate, the base cuneate; main nerves faint, 6 to 8 pairs, curving; length 3 to 5 in., breadth 1·2 to 1·6 in.; petiole ·35 to ·5 in., slender. *Flowers* ·35 in. in diam., in dense shortly-pedicelled clusters of 7 or 8. *Petals* narrowly oblong, obtuse, very fugaceous, thin. *Drupe* ovoid, ·25 in. long, the pulp thin. Hook. fil. Fl. Br. Ind. I, 414.

In all the provinces except the Andamans and Nicobars. DISTRIB. Sumatra, Borneo.

2. ERYTHROXYLON, Linn.

Shrubs or small trees, usually quite glabrous. *Leaves* alternate, entire, often subdistichous; stipules intrapetiolar, often imbricating on short arrested leafless branches. *Flowers* axillary, small, white or pink, solitary or fascicled, peduncles bracteolate. *Sepals* 5, rarely 6, free or connate. *Petals* 5, hypogynous, deciduous, with an erect double ligula on the inner face, imbricate. *Stamens* 10, rarely 12, filaments united into a glandular or eglandular tube. *Ovary* 3- rarely 4-celled; styles 3, rarely 4, free or connate, stigmas capitate; ovules, 1, rarely 2 in each cell. *Drupe* 1-celled, 1-seeded. *Seed* with a thin testa, albumen variable in quantity or 0; embryo straight, cotyledons plano-convex, radicle short.—DISTRIB. Species about 50, mostly American, and tropical.

1. ERYTHROXYLON BURMANICUM Griff. Notul. IV, 468: Ic. Pl. Asiat. t. 581, f. 3. A glabrous tree 20 to 30 feet high. *Leaves* elliptic or obovate-elliptic, obtuse or slightly emarginate, the base cuneate; upper surface shining, the lower glaucous, both with open reticulations; the main nerves about 8 pairs, not more prominent than the secondary; length 1·75 to 2·5 in., breadth ·75 to 1·25 in., petiole ·2 to ·3 in. *Flowers* in clusters of 2 to 4, their pedicels about ·25 in. long. *Fruit* cylindric-clavate, shining, ·5 in. long; the calyx and staminal tube sub-persistent. Hook. fil. Fl. Br. Ind. I, 415; Kurz For. Fl. Burma I, 171. *E. sumatranum*, Miq. Fl. Ind. Bat. Suppl. 572. *E. retusum*, Bauer ex Teysm. and Binn. in Tijdisch Nat. Ver. Ned. Ind. XXVIII, 71. *Ficus cuneata*, Wall. Cat. 4534.

In all the provinces. DISTRIB. Burma, Sumatra.

3. IXONANTHES, Jack.

Glabrous trees, often turning black in drying. *Leaves* alternate, entire or crenate-serrate, reticulate; stipules minute or 0. *Flowers* small, in axillary cymose dichotomous peduncled panicles. *Sepals* 5–6, shortly connate at the base. *Petals* 5–6, perigynous, contorted, persistent, hardened round the fruit. *Stamens* 10–20, inserted on the outside of a perigynous annular or cupular eglandular disk. *Ovary* free, 5-celled, cells perfectly or imperfectly 2-locellate; style simple, stigma capitate, lobed; ovules 10. *Capsule* coriaceous or woody, oblong or conic, more or less perfectly 10-celled, septicidal, carpels opening inward. *Seeds* winged or crowned with a mitriform aril, albumen fleshy; embryo lateral, cotyledons foliaceous, radicle superior.—DISTRIB. Species 3–4, chiefly Malayan.

Leaves oblong-oblanceolate to obovate-oblong, petals ·2 in. long. Capsules ·7 in. long, imperfectly 10-celled ... ... 1 *I. icosandra.*
Leaves elliptic to elliptic-rotund, not obovate; petals ·3 in. long. Capsules 1·35 to 1·75 in. long, almost completely 10-celled ... 2 *I. reticulata.*

1. IXONANTHES ICOSANDRA, Jack Mal. Miscel. II, No. 7 p. 53: Hook. Comp. Bot. Mag. I, 154. A tree 30 to 40 feet high. *Leaves* coriaceous, oblong-oblanceolate to obovate-oblong, the apex blunt or much rounded; the edges entire, obscurely serrate or crenate, the base cuneate: main nerves spreading, sub-horizontal, faint, about 10 to 12 pairs: length 2·5 to 5·5 in., breadth 1 to 2·5 in., petiole ·25 to ·5 in. *Cymes* on slender peduncles, many-flowered. *Flowers* ovoid, ·2 in. long, scarcely opening; petals broadly elliptic: stamens 12 (usually), the filaments, much longer than the petals. *Capsule* narrowly ovoid, ·7 to ·8 in. long, 5-valved, imperfectly 10-celled. *Seeds* 10, on elongated podosperms. Hook. fil. Fl. Br. Ind. I, 416; Miq. Fl. Ind. Bat. i., pt. 2, 494. *I. dodecandra*, Griff. Plant. Cantor 12. *I. cuneata*, Miq. Fl. Ind. Bat. Suppl. 484 and Hook. fil. Fl. Br. Ind. I, 416. *I. obovata* Hook. fil. Fl. Br. Ind. I, 417. *Gordonia? peduncularis*, Wall. Cat. 4409. *Hypericinea dentata*, Wall. Cat. 4832. *Picrotia lucida*, Blume Mus. Bot. i. 180. *Brewstera crenata*, Roem. Synops. i. 141. *Macharisia icosandra*, Planch. MSS. *Ixonanthes sp.* Griff. Notul. iv. 498; Ic. Pl. Asiat., t. 589, f. 2.

In all the provinces except the Nicobars and Andamans; very common.

This is rather a variable plant as to leaves, and to two of the forms specific names have been given. I cannot, however, discover any tangible differences in the flowers or fruit, so I have treated all the forms as belonging to Jack's *I. icosandra.* The fruit is only imperfectly 10-celled in this species, the vertical processes from the back walls of the cells of the capsule being incomplete. In the next species they are nearly quite complete, and its capsules are really 10-celled.

2. IXONANTHES RETICULATA, Jack in Mal. Miscel. II, No. 7, 51; Hook. Comp. Bot. Mag. I. 154. A small tree, occasionally only a shrub. *Leaves* coriaceous, not black when dry, elliptic, sometimes elliptic-rotund, the apex blunt, the base cuneate; main nerves 7 or 8 pairs, slightly prominent when dry, interarching ·25 in. from the edge; length 3·5 to 5 in., breadth 2 to 2·75 in., petiole ·6 to ·8 in. *Cymes* on stout peduncles, few-flowered. *Flowers* ovoid to ovoid-rotund, scarcely opening, ·3 in. long, petals broadly elliptic; stamens about 10, the filaments much longer than the petals. *Capsule* 1·35 to 1·75 in, long, 5-valved, 10-celled. Hook. fil. Fl. Br. Ind. I, 417; Griffith Plant. Cantor, 11. *Hypericinea macrocarpa,* Wall. Cat. 4833. *Gordonia decandra,* Roxb. Fl. Ind. ii., 573; Wall. Cat. 4408.

In all the provinces except the Nicobar and Andaman Islands. DISTRIB. Sumatra.

In this species the 5 cells of the fruit are converted into 10 by a dissepiment springing from the wall of each valve. I have never seen the seeds, all the capsules I have met with being empty.

ORDER XXI. MALPIGHIACEÆ.

Trees or shrubs, often climbing. *Leaves* (in the Indian genera) opposite, quite entire; stipules small or 0. *Inflorescence* axillary or terminal; pedicels articulate, usually 2-bracteolate. *Flowers* middling-sized or small, white or yellow, more rarely red, yellow, or blue, hermaphrodite, regular or irregular. *Calyx* usually 5-partite; segments imbricate or valvate, 1 or more (never all) furnished with a large gland, rarely eglandular (*Aspidopterys*). *Petals* 5, clawed or not, often fimbriate, imbricate. *Disc* obscure. *Stamens* 10, hypogynous or subperigynous, equal, or 1 or more much larger than the others, filaments free or connate below, anthers 2-lobed. *Ovary* 3-celled; styles 1–3, rarely 4, straight or circinate, stigmas capitate or punctiform or lateral; ovules solitary in each cell, micropyle superior, raphe ventral. *Fruit* (in all the Asiatic genera except *Brachylophon*) of one or more winged samaras. *Seed* exalbuminous; embryo straight or curved, radicle superior.—DISTRIB. An order, largely represented in America, but scantily in Asia; genera about 50, species about 620.

Styles 1 rarely 2; calyx glandular.
  Fruit of 3, united, many-winged samaras ... 1. *Tristellateia.*
  Fruit usually of a single 3-winged samara ... 2. *Hiptage.*

Styles 3 rarely 4; calyx eglandular.
  Samaras with large membranous reticulate wings ... ... 3. *Aspidopterys.*
  Fruit of 2 or 3 turgid almost wingless cocci 4. *Brachylophon.*

1. TRISTELLATEIA, Thouars.

Woody climbers. *Leaves* opposite or whorled; petiole 1–2-glandular at the apex; stipules minute. *Flowers* yellow, in terminal or lateral racemes. *Calyx* 5-partite, eglandular, or with minute glands. *Petals* 5, clawed. *Stamens* 10, all perfect; filaments rigid, truncate and articulate at the top, anthers acute. *Ovary* 3-lobed; styles 1–2, slender, one or more reduced to small papillæ. *Ripe carpels* 3, each with about 3 or more wings, the whole forming a stellate fruit. *Seed* obovoid, testa membranous; cotyledons fleshy, hooked.—DISTRIB. About 8 species, natives of tropical Africa, Asia, and Australasia.

1. TRISTELLATEIA AUSTRALASICA, A. Rich. Sert. Astrol. 38 t. 15. Glabrous; *leaves* elliptic, ovate, or oblong, acute, the base cuneate or rounded; main nerves 4 or 5 pairs, forming wide arches far from the margin, faint; length 1·75 to 3·5 in., breadth ·75 to 1·25 in., petiole ·25 to ·35 in., eglandular or with only one gland. *Racemes* 2 to 6 in. long, few-flowered, terminal. *Flowers* 1 in. in diam., their pedicels opposite, minutely 2-bracteolate towards the base. *Petals* ovate. *Fruit* ·5 in. in diam., its wing linear-oblong, coriacious, recurved or spreading. Hook. fil. Fl. Br. Ind. I, 418; Benth. Flor. Austral. I. 286. *Platynema laurifolium*, W. & A. in Edin. New Phil. Journ. 1833, 179; Prodr. 107

Singapore; Wight, Kurz, Anderson. Pangkore, Scortechini. Pahang, Ridley. DISTRIB.—Malayan Archipelago, Australasia.

2. HIPTAGE, Gærtner.

Climbing or suberect shrubs. *Leaves* opposite, quite entire, coriaceous, eglandular, or with a row of remote intramarginal glands beneath; stipules 0. *Racemes* terminal or axillary, simple or compound; peduncles erect, bracteate, jointed to the 2-bracteolate pedicels. *Calyx* 5-partite; glands adnate to the pedicel, large. *Petals* 5, clawed, unequal, white, the odd one discoloured. *Stamens* 10, all fertile, declinate, one much larger than the others; filaments connate at the base. *Ovary* with 3 appendiculate lobes; styles 1 or 2 bearing stigmas, the others rudimentary, all circinate. *Fruit* winged. *Seed* sub-globose, the cotyledons unequal, thick. DISTRIB: four tropical Asiatic species.

Main nerves of leaves about 4 pairs, inflorescence tomentose or sericeous, flowers ·35 to ·5 in. in diam ... ... 1. *H. sericea.*

Main nerves of leaves 4 to 6 pairs, inflorescence adpressed-pubescent; flowers ·75 to 1 in., in diam. ... ... 2. *H. madablota.*

1. HIPTAGE SERICEA, Hook. fil. Fl. Br. Ind. I, 419. A woody climber, the branches and inflorescence more or less covered with soft brown, villous pubescence; lateral branchlets slender, short. *Leaves* elliptic-ovate or oblong, acuminate, glabrous; main nerves about 4 pairs, ascending; length 2 to 6 in., breadth ·9 to 3 in., petiole ·25 in. *Racemes* 2 to 3·5 in. long, axillary and terminal, sometimes much crowded, minutely tomentose or sericeous, many-flowered. *Flowers* ·35 to ·5 in. in diam., pedicels thickened at the apex, ·25 to ·5 in. long. *Petals* clawed, the odd one much lobed, all more or less villous especially externally; central wing of carpel oblanceolate obtuse, with a central ridge near its base, 1·5 to 2 in. long, the lateral much smaller. *H. parviflora*, Wight Cat. 358. *Clerodendron sericeum*, Wall. Cat. 1814.

Penang: Wallich, King's collector, No. 1454. Singapore, Ridley. Pahang, Ridley No 2386. Malacca, Griffith, Derry. Maingay, (Kew Distrib.) No. 272. Perak, King's collector No. 4097.—DISTRIB. Burmah. Gallatly, No. 890.

This is a very variable plant as to leaves, some of the forms having narrowly oblong, while others have broadly elliptic leaves; the nervation is, however, alike in all. As regards vestiture there is also variation, the inflorescence being in some villous, in others minutely tomentose or pubescent. This must come very near, if it be not actually identical with, *H. javanica*, Blume. The Burmese form of this species has not only narrowly oblong leaves, but racemes 6 inches long and more slender than in Malayan specimens. I propose to name it VAR. *longe-racemosa*.

2. HIPTAGE MADABLOTA, Gærtn. Fruct. II, 169, t. 116. A glabrous woody climber, the young parts and inflorescence hoary or adpressed-tomentose, the branches stout. *Leaves* coriaceous, ovate-lanceolate, oblong or ovate-oblong, acute or shortly acuminate, the base rounded or cuneate, both surfaces glabrous: main nerves 4 to 6 pairs, oblique, slightly prominent beneath; length 4·5 to 6 in., breadth 1·5 to 3 in., petiole ·25 to ·4 in. *Racemes* 1 to 6 in. long, axillary, sometimes leafy, adpressed-pubescent. *Flowers* ·75 to 1 in. in diam., fragrant. *Sepals* obtuse, less than half as long as the petals. *Petals* fimbriate, the odd one dashed with yellow. *Fruit* with three coriaceous spreading wings, the middle one oblanceolate, obtuse, 1 to 2 in. long, the 2 lateral linear and half as large. Hook. fil. Fl. Br. Ind. I, 418; Kurz For. Flora Burma I, 173; Miq. Fl. Ind. Bat. I, Pt. 2, 585; DC. Prod. I, 583; W. and A. Prod. 107; Wight Ill. t. 50. *Molina racemosa*, Lamk. Dict. IV. 227; Cav. Diss. IX. t. 263. *Gærtnera racemosa*, Roxb. Cor. Pl. I. t. 18; Fl. Ind. II, 368.

Banisteria bengalensis, Linn. *B. unicapsularis*, Lamk. *B. tetraptera*, Sonnerat Voy. II, t. 135. Rheede Hort. Malab. VI, t. 59.

In all the provinces. DISTRIB. British India, China, Malayan Archipelago.

3. ASPIDOPTERYS, A. Juss.

Shrubs, usually climbing. *Leaves* opposite, eglandular, quite entire; stipules 0. *Flowers* in simple or compound axillary and terminal panicles; peduncles bracteate, jointed at the top, pedicels often minutely 2-bracteolate. *Flowers* small, yellow or white. *Calyx* short, 5-partite, eglandular. *Petals* 5, not clawed, spreading or reflexed, quite entire. *Stamens* 10, all perfect, filaments connate or distinct at the base. *Ovary* 3-lobed, lobes flattened at the back, sides winged; styles 3, glabrous, stigmas capitate. *Fruit* of 1–3 samaras; nucleus sometimes crested or winged at the back, and surrounded with a broad oblong or orbicular wing. *Seeds* oblong, subterete; embryo, straight, cotyledons equal, radicle short.—DISTRIB. Species about 15; all tropical Asiatic.

Leaves ovate or obovate, more or less orbicular; panicles slender, lax, with short few-flowered lateral branches: samaras ovate, narrowed and retuse at the apex ... 1 *A. concava*.

Leaves ovate or elliptic, narrowed upwards, not orbicular; panicles spreading, the branches umbellate, many-flowered: samaras orbicular ... ... 2 *A. Helferiana*.

1. ASPIDOPTERYS CONCAVA, A. Juss. in Archiv. Mus. Hist. Nat. III, 509. A climber; young shoots rusty-puberulous, soon becoming glabrous. *Leaves* ovate-elliptic or elliptic, bluntly and shortly acuminate, the base rounded or very slightly narrowed: both surfaces glabrous, the lower minutely dotted when young; main nerves 4 to 6 pairs, curving, ascending; length 3 to 4·5 in., breadth 1·5 to 2·3 in., petiole ·5 to ·65 in. *Flowers* in spreading lateral umbellate panicles. *Samaras* orbicular, membranous, pale, reticulate, the veins radiating, the nucleus winged, about 1·25 in. in diam; their pedicels slender, minutely bracteolate, often 1·5 in. long. Hook. fil. Fl. Br. Ind. I, 420; Kurz For. Flora Burmah, I, 175. *Hiraea concava*, Wall. Pl. As. Rar. I, 13; Cat. 1061. *H. merguensis*, Wight. Ill. I, 139.

Penang; Curtis No. 138, 798. DISTRIB. Burmah.

2. ASPIDOPTERYS HELFERIANA, Kurz Journ. As. Soc. Bengal, Pt. 2, (1874), 137, 184; For. Flora Burma, I., 176. A climber, the young shoots tawny-pubescent. *Leaves* membranous, orbicular-ovate to orbicular-obovate, the apex shortly cuspidate, the base rounded or slightly

cordate, glabrous; main nerves 4 or 5 pairs, curved, ascending; length 3 to 5·5 in., breadth 2·5 to 5 in.; petiole ·5 to ·65 in., puberulous or glabrescent. *Panicles* axillary or terminal, slender, lax, rusty-puberulous when young, the lateral branches distant, few-flowered; ovary quite glabrous, lobes of disc scarcely rugose. *Samaras* ovoid, narrowed towards the retuse apex, membranous, pale brown, with many radiating nerves, reticulate, glabrous, 1 in. or more in length, nucleus with oblong wing. *Hiraea indica* (?) Wall. Cat. 1057.

Andaman Islands. DISTRIB. Burmah.

The type of this species is one of the things included under Wall. Cat. 1057, with which the Andaman specimens in the Calcutta Herbarium agree very well. Kurz has however also referred to this species certain Burmese specimens, *viz.*, Falconer's No. 72 (from Upper Weingo Valley) and Helfer's No. 923, which, although agreeing with each other, hardly agree with the Wallichian No. 1057 from Neidann. By the way! this sheet from Neidann is not included in Wallich's lithographed and published list.

4. BRACHYLOPHON, Oliver.

Glabrous shrubs. *Leaves* opposite, entire. Inflorescence terminal, racemose or corymbose, bracteolate. *Flowers* yellow. *Calyx* 5-partite, eglandular. *Petals* 5, imbricate in bud. *Stamens* 10, all perfect, the alternate shorter; filaments longer than the anthers, flat, conjoined at the base into a short disc: anthers linear, basifixed, opening by 2 apical pores. *Ovary* deeply 3–4-lobed, 3–4-celled; *Styles* 3 or 4, elongate, slender, divergent: ovules solitary in each cell, pendulous, anatropous. *Fruit* usually 3-, sometimes only 2-lobed; separating when ripe into turgid cocci; each coccus keeled along the back, and at the apex produced into a very short wing. *Seed* unknown. DISTRIB. Three species; all Malayan.

Rachides of the racemes ·5 in. long or less, leaves coriaceous ... ... 1 *B. Hullettii.*
Rachides of the racemes 2 in. or more in length.
  Main nerves of leaves 7 to 8 pairs, oblique 2 *B. Curtisii.*
  Main nerves of leaves 13 to 15 pairs, sub-horizontal ... ... 3 *B. Scortechinii.*

1. **BRACHYLOPHON HULLETTII**, King. n. sp. *Leaves* coriaceous, shining, minutely reticulate, narrowly elliptic, shortly and abruptly acuminate or acute, the base cuneate: main nerves 10 to 12 pairs, rather prominent beneath, sub-horizontal, interarching far from the margin; length 4 to 7 in., breadth 1·8 to 2·5 in., petiole ·1 in. *Racemes* terminal, the

rachis less than ·5 in. long, 4-to 8-flowered; pedicels ·75 in. long, bracteolate at the base. *Sepals* ovate, blunt.

Malacca: on mount Ophir, Hullett.

An imperfectly known plant, easily distinguished from both the other species by its much shorter racemes and more coriaceous leaves.

2. BRACHYLOPHON CURTISII, Oliver in Hook. Ic. Plantar. t. 1566. A shrub 3 to 6 feet high. *Leaves* membranous, narrowly elliptic to ovate-rotund, acuminate, the base cuneate; upper surface glabrous, the lower scaberulous; main nerves 7 or 8 pairs, not much more prominent than the intermediate, oblique, interarching ·15 in. from the edge; length 3·5 to 7 in., breadth 2 to 2·25 in., petiole ·1 in. *Racemes* corymbose, 1 to 2 in. long. *Flowers* ·75 in. in diam.; pedicels slender, ·8 to 1·2 in. long, bracteolate at the base. *Petals* yellow, oblong, obtuse, entire, shortly clawed, ·5 in. long. *Ripe fruit* ·35 to ·5 in. long, ·25 in. broad.

Penang: Curtis No. 231.

3. BRACHYLOPHON SCORTECHINII, King, n. sp. A shrub 3 to 6 feet high. *Leaves* membranous, oblong-lanceolate to oblong-elliptic, sometimes oblong-oblanceolate, tapering from the middle to each end, both surfaces glabrous: main nerves 13 to 15 pairs, rather faint, sub-horizontal, interarching ·15 to ·2 in. from the edge: length 5 to 11 in., breadth 2 to 4 in., petiole ·15 in. *Racemes* corymbose, terminal and axillary, 2 to 3 in. long, many-flowered, the rachis tuberculate. *Flowers* about ·6 in. in diam.; pedicels slender, ·65 to 1 in. long, bracteolate at the base. *Calyx-teeth* oblong, obtuse, puberulous, the edges ciliolate. *Petals* ovate, obtuse, entire, glabrous, ·5 in. long. *Filaments* flattened, unequal but all much longer than the petals. *Ovary* 3- to 4-lobed, or 3- to 4-celled: styles 3 or 4, as long as the filaments, spreading, cylindric. *Fruit* unknown. *Ryssopteris elliptica*, Scortechini MSS.

Perak: Scortechini, Wray, King's collector.

I have not seen fruit of this. In its flowers it closely resembles *B. Curtisii*, Oliver, but its leaves are larger, more membranous, and have more numerous nerves than those of *B. Curtisii*.

ORDER XXII. GERANIACEÆ.

Herbs, undershrubs, or rarely trees; glabrous or more usually pubescent and glandular. *Leaves* opposite or alternate, usually 2-stipulate. *Peduncles* usually solitary and axillary, 1- or more flowered. *Flowers* umbelled, cymose or racemose, usually showy, hermaphrodite, regular or irregular. *Sepals* 5, rarely 4 or 2, free or united to the middle, imbricate or rarely valvate, the posticous sometimes spurred. *Petals* as many as the sepals or fewer by suppression, or 0, hypogynous or subperigynous, variously imbricated, rarely contorted. *Torus* scarcely expanded into a disc, with 5 glands alternating with the petals, or without glands, raised in the centre into a beak, rarely flat. *Stamens* as many as, or double, or treble the sepals, or fewer by suppression; filaments filiform or dilated, or connate into a ring; anthers 2-celled; cells parallel, opening lengthwise. *Ovary* 3–5-lobed, 3–5-celled, rarely 2-lobed, of 3–5-carpels, united with the axis as far as the insertion of the ovules, sometimes lengthened into a beak-bearing style or styles, which are free or more or less united; stigmas capitate, linear or ligulate; ovules 1 or 2 or rarely more, horizontal or pendulous or ascending. *Fruit* capsular, 3–5-lobed, lobes 1-seeded, often separating from the axis, septicidal or loculicidal, rarely berried. *Seeds* pendulous or horizontal, albumen 0, or scanty or fleshy; embryo straight or curved; cotyledons flat, convex or variously folded, foliaceous or thick or fleshy; radicle either short and near the hilum, or longer and inflected, or incumbent on the cotyledons.—DISTRIB. Genera 20, with about 800 species, chiefly inhabiting temperate climates.

OXALIDEÆ.—Leaves compound, flowers regular.
- Herbaceous.
  - Leaves 3-foliolate ... ... 1. *Oxalis.*
  - Leaves pinnate ... ... 2. *Biophytum.*
- Woody.
  - Shrubs or trees, not scandent, fruit probably indehiscent ... ... 3. *Connaropsis.*
  - Scandent shrubs, fruit certainly dehiscent 4. *Dapania.*

BALSAMINEÆ.—Leaves simple, flowers irregular.
- Lateral petals connate in pairs, fruit capsular. 5. *Impatiens.*
- Lateral petals free: fruit drupaceous ... 6. *Hydrocera.*

1. OXALIS, Linn.

Acid herbs, rarely shrubby. *Leaves* radical or alternate, stipulate or ex-stipulate, compound, usually 3-foliolate. *Flowers* on axillary, 1- or more flowered peduncles, regular. *Sepals* 5, imbricate. *Petals* 5, hypogynous, contorted. *Glands* of the disc 0. *Stamens* 10, free or united at the base, all anther-bearing. *Ovary* 5-lobed, 5-celled; styles 5, distinct; stigma terminal, captitate, 2-fid or laciniate: ovules 1 or more in each cell. *Capsule* with loculicidal dehiscence, valves persistent to the axis. *Seeds* with an outer fleshy coat which bursts elastically, testa crustaceous, albumen fleshy, embryo straight.—DISTRIB. Species about 200, chiefly tropical and temperate S. American and S. African.

1. OXALIS CORNICULATA Linn. DC. Prod. I, 692. A diffuse, creeping, adpressed-pubescent herb with long-petioled 3-foliolate, stipulate

leaves; the leaflets obcordate, the stipules adnate to the petiole. *Flowers* sub-umbellate on 2- to many-fid, setaceously bracteolate peduncles. *Sepals* obtuse. *Petals* obcordate, yellow. *Fruiting pedicels* often depressed. *Capsules* sub-cylindric, tomentose, many-seeded. *Seeds* transversely striate. Hook. fil. Fl. Br. Ind. I, 436; Miq. Fl. Ind. Bat. I, pt. 2. p. 135; Boiss. Fl. Orient. i., 866; Wall. Cat. 4347; Roxb. Fl. Ind. ii. 457; W. & A. Prodr. 142. *O. repens*, Thunb; Wight Ic. t. 18; Blume Bijdr. 243. *O. pusilla*, Salisb.; Roxb. l.c.

Perak: by the sides of damp foot-paths near the bases of the hills. Penang: on Government Hill, Curtis.

2. BIOPHYTUM, De Cand.

Annual, rarely perennial herbs, with simple or branched stems. *Leaves* abruptly pinnate, fascicled or almost whorled at the top of the stem; leaflets opposite, oblique; petiole swollen at the base. *Peduncles* terminal, pedicels umbelled. *Flowers* small, yellow, or white. *Sepals* 5, lanceolate, acuminate. *Petals* 5. *Stamens* 10; filaments free, 5 outer smaller. *Styles* 5, stigmas notched at the apex or 2-fid. *Capsule* ovoid or oblong, or subglobose, splitting loculicidally sometimes to the base into 5 spreading valves. *Seeds* as in *Oxalis*.—DISTRIB. Tropical Asia, Africa, and America. Species about 20.

Leaflets 8 to 20 pairs, equal-sided, glabrous, their bases truncate, slightly oblique: flower-pedicels usually shorter than the sepals, petals yellow	1. *B. sensitivum.*
Leaflets 18 to 25 pairs, unequal-sided, sparsely hispid on upper surface, their bases obliquely truncate; flower-pedicels longer than the sepals, petals white...	2. *B. adiantoides.*

1. BIOPHYTUM SENSITIVUM, DC. Prod. I, 690. Stem 4 to 10 in. long, hispidulous, erect or decumbent, bearing at its apex 8 to 20 pinnate leaves 1·5 to 5 in. long; leaflets 6 to 15 pairs, the lower pairs oblong, the upper pair obovate-oblong, the apices of all obtuse, sometimes mucronate, the bases truncate, subequal, glabrous, ·25 to ·5 in. long. *Peduncles* variable in length, sometimes nearly as long as the leaves, puberulous, each bearing at its apex a bracteolate umbel of 10 or 12 flowers; bracteoles setaceous, as long as the flower pedicels, pedicels pubescent, as long as the sepals. *Petals* yellow. Hook. fil. Fl. Br. Ind. I, 436; Roxb. Fl. Ind. II, 457; W. and A. Prod. 162; Bot. Reg. XXXI, t. 68; Wall. Cat. 4343 C. E.

Malacca: Griffith. Penang, on the coast, Curtis; and probably in the other provinces.

2. BIOPHYTUM ADIANTOIDES, Wight ex Hook. fil. Fl. Br. Ind. I, 437. Stem from 6 to 12 in. high, erect or decumbent, pubescent, bearing at its apex 10 or 12 pinnate leaves 4 to 7 in. long; leaflets 18 to 25 pairs, oblong, obtuse, unequal-sided, the apex mucronate, the base obliquely truncate, sometimes auriculed at the upper margin, sparsely strigose on the upper surface. *Peduncles* more than half as long as the leaves, pubescent, each bearing at its apex a densely bracteolate umbel of 6 to 12 flowers; bracteoles short, setaceous: flower-pedicels slender, puberulous, longer than the sepals. *Petals* white, the claws yellow.

Perak: on the banks of the Kamha river, King's collector, No. 931; on the Plus river, Wray No. 3363. Goping, Scortechini, No. 1999. DISTRIB. Burmah.

3. CONNAROPSIS, Planch.

Trees or shrubs. *Leaves* pinnately 1–3-foliolate; leaflets coriaceous, quite entire, strongly nerved, triple-nerved at the base, margined. *Flowers* minute, regular, in terminal and axillary panicled cymes. *Sepals* 5, imbricate, connate at the base. *Petals* 5, imbricate. *Glands* 0. *Stamens* 10, filaments united at the base, the alternate shorter. *Ovary* 5-angled, 5-celled; styles 5, subulate, more or less united below, stigmas apiculate; ovules 2 in each cell. *Fruit* fleshy, 5-lobed or 5-angled with succulent epicarp and fibrous endocarp, 1- or 2-celled and 1- or 2-seeded by abortion, indehiscent. DISTRIB. Five species, all Malayan.

Leaves 3-foliolate ... ... 1. *C. Griffithii.*
Leaves 1-foliolate.
  Leaves 2 to 3·5 in. long ... ... 2. *C. monophylla.*
  Do. 6 to 12 in. long ... ... 3. *C. macrophylla.*

1. CONNAROPSIS GRIFFITHII, Planch. in Hook. fil. Fl. Br. Ind. 440. A small tree; young shoots glabrescent, dark-coloured when dry. *Leaves* pinnately trifoliolate, coriaceous, glabrous; leaflets elliptic-lanceolate, acuminate, the base cuneate; main nerves 4 pairs, ascending: length 2 to 3·5 in., breadth ·5 to 1 in., petiolule ·15 in. *Panicles* terminal, minutely ferruginous-tomentose, 1·5 to 2 in. long. *Fruit* unknown.

Malacca: Griffith, No. 1667. Maingay (Kew Distrib.), No. 274.

2. CONNAROPSIS MONOPHYLLA, Planch. Hook. fil. Fl. Br. Ind. I., 440. A shrub or small tree; young shoots minutely ferruginous-pubescent. *Leaves* 1-foliolate, coriaceous, glabrous, ovate, acuminate, the base rounded or sub-cuneate: main nerves about 6 pairs, faint; length 2 to 3·5 in., breadth ·8 to 1·5 in.; petiole ·6 to ·8 in., thickened and pointed towards the apex. *Panicles* terminal or lateral, 2 to 4 in. long, ferruginous-tomentose; the branches erect and spike-like; flowers

crowded. *Fruit* ovoid, glabrous, obtusely 5-angled and furrowed, ·3 in. long.; endocarp fibrous, sarcocarp fleshy.

Malacca; Griffith No. 947; Maingay (Kew Distrib.) as 273. Perak, Scortechini, King's collector, Wray.

3. CONNAROPSIS MACROPHYLLA, King n. sp. A shrub or small tree: young branches glabrescent or glabrous. *Leaves* 1-foliolate, coriaceous, glabrous, oblong, acute or shortly acuminate, scarcely narrowed to the rounded sub-truncate or sub-emarginate base; main nerves 8 or 9 pairs, spreading, the reticulations distinct beneath: length 6 to 12 in., breadth 2·35 to 3·65 in.; petiole ·5 in., jointed above the middle. *Flowers* in two or three terminal or lateral spikes which are sometimes united to form a kind of panicle. *Spikes* glabrescent, 2 or 3 in. long. *Flowers* crowded. *Fruit* ovoid, apiculate, glabrous, about ·3 in. long.

Perak: King's collector, Nos. 433, 3124; Ridley No. 3087. Province Wellesley; Curtis No. 474.

4. DAPANIA, Korthals.

Woody climbers. *Leaves* alternate, simple, coriaceous, entire, the petiole jointed about the middle. *Flowers* small, regular, sometimes unisexual, in slender spike-like racemes which are solitary, or in fascicles, axillary or from tubercles on the stem. *Sepals* 5, connate at the base, imbricate. *Petals* 5, hypogynous, imbricate, longer than the sepals. *Stamens* 10, the alternate 5 shorter, all united at the base into a shallow tube. *Ovary* deeply 5-lobed, 5-celled, each cell usually with 1 (sometimes with 2) pendulous ovule from an axile placenta. *Fruit* clavate, the calyx persistent but not enlarged, deeply 5-lobed, the epicarp slightly fleshy, the endocarp fibrous, 5-celled, 5-seeded, dehiscing loculicidally so as to form a five-rayed fibrous star with a seed attached to the central ridge (placenta) of each segment. DISTRIB. About 4 species; all Malayan.

1. DAPANIA SCANDENS, Stapf in Hook. Ic. Pl., t. 1997. A glabrous climber 50 to 100 feet long. *Leaves* ovate-elliptic, acuminate, the base rounded; main nerves 4 or 5 pairs, ascending, faint, length 3 to 5 in., breadth 1·25 to 2 in.; petiole ·25 to ·35 in., jointed about the middle. *Racemes* slender, puberulous, about 1·5 to 2·5 in. long. *Flowers* some hermaphrodite and some with stamens only, ·1 to ·15 in. long, each with a minute ovate bracteole at the base of its short pedicel. *Calyx-lobes* obtuse, ciliolate. *Petals* oblong, ob-lanceolate, twice as long as the calyx. *Fruit* 3 in. long, dehiscing into a flat star-shaped mass 4 in. in diam. *Connaropsis dioica*, Scortechini MSS. in Herb. Calcutta.

Perak: Curtis. Scortechini, Wray, King's collector.

By far the majority of the flowers have stamens only, the pistils being either quite rudimentary or absent: these male flowers are about half as long again as the hermaphrodites. The genus *Dapania* was founded by Korthals to receive the Sumatran plant which that author called *D. racemosa.* Of this, there is an authentic specimen in the Calcutta Herbarium; but unfortunately it has neither flowers nor fruit. Amongst Forbes' plants collected in Sumatra, No. 1217 agrees so perfectly with Korthal's *D. racemosa* in foliage, as to leave no doubt that it belongs to the same species; and on Forbes' specimens there are ripe fruits. These ripe fruits, as well as its leaves, show *D. racemosa* to be quite distinct from *D. scandens*, Stapf, the leaves being thinner in texture, and the fruits longer than those of *D. scandens.* The seeds of Forbes' specimens do not, however, show the curious aril (laciniate and almost 2-lipped) which Korthals describes: and, as the seeds of *D. scandens* show no trace of an aril, I agree with Dr. Stapf that Korthals probably described the existence of an aril as the result of some confusion. The majority of the ovaries dissected by me have only a single ovule: in one or two cases, however, a second (as figured by Dr. Stapf) has been found. In no case, however, have I found two seeds in a loculus of the fruit. There is no doubt that, as Dr. Stapf points out, the genus *Connaropsis* comes very near *Dapania*; and it may become desirable, as both genera became better known, to reduce *Connaropsis* (which dates only from 1862) to *Dapania* which was published in 1854. In the meantime the fruit of *Connaropsis* is not properly known, and there is no evidence that it is dehiscent. The fruit of *C. monophylla* is very like that of *Dapania scandens*, but no specimens that I have seen show any sign of dehiscence; while that of *C. macrophylla* is but little angled externally and the appearance of all the specimens I have seen is suggestive of indehiscence. Moreover, all the species of *Dapania* appear to be scandent; while all those of *Connaropsis* are shrubby or arboreous. Concerning the structure of the seeds I can say nothing, not having met with good seeds of either. The two genera remain at present separated chiefly by these two points of difference, *viz.*, dehiscence of the fruit and habit. Whether others may be found remains to be seen when better materials shall be obtained.

Beccari's specimen (P. S. 900) appears to belong to a species slightly different from either *D. scandens* or *D. racemosa.* And, as I understand from Dr. Stapf, the same Collector's No. 2951, from Borneo (which I have not myself examined), belongs to still another species.

5. IMPATIENS, Linn.

Herbs, rarely shrubby at the base. *Leaves* opposite or alternate, in some whorled, in others all radical, simple, exstipulate, or with stipular glands at the base of the petiole. *Flowers* in scapes, or in axillary or terminal 1–2 or many-flowered peduncles, irregular, resupinate. *Sepals* 3, rarely 5, imbricate; 2 anterior when present minute; 2 lateral small, flat, usually green; posterior (anterior in flower) large, petaloid, produced into a hollow spur or sac. *Petals* 3 (or 5); anterior (outer in bud) large; lateral 2-lobed (or 2 connate). *Stamens* 5, filaments short, broad; anthers cohering. *Disc* 0. *Ovary* oblong, 5-celled; stigma sessile, 5-toothed; ovules many, 1-seriate in each cell. *Capsule* loculicidal; valves 5, elastically springing away from a placentiferous axis. *Seeds* smooth or tubercled, glabrous or hairy, albumen 0; embryo straight.—DISTRIB. Mountainous parts of Trop. Asia and Africa, rare in Temp. Europe, N. America, N. Asia, and S. Africa; species about 200.

Flowers yellow: stem fleshy, several feet high and more than a foot in diam. at the base ... 1. *I. mirabilis.*
Flowers lilac, purple or white: stems herbaceous, slender.
  Leaves linear-lanceolate, the upper whorled, the lower in pairs, opposite... 2. *I. Griffithii.*
  Leaves linear-oblong to obovate or rotund, all opposite ... ... 3. *I. chinensis.*

1. IMPATIENS MIRABILIS, Hook. fil. in Curtis's Bot. Mag., t. 7195. Stem fleshy, cylindric, 3 to 5 feet high and 18 to 20 in. in diam. at the base, branched above. *Leaves* thinly fleshy, crowded at the ends of the branches, much narrowed to the base, obovate to ovate, crenate, with a thick fleshy midrib and 13 or 14 pairs of faint pinnate nerves, both surfaces glabrescent: length 5 to 7 in., breadth 3·5 to 4·5 in., petiole 1 to 1·5 in. *Racemes* axillary, as long as, or longer than the leaves, slender, and few-flowered. *Flowers* yellow, 1·75 in. long, sepals 3; the lateral elliptic-oblong, acute; the posterior widely hemispheric with a short incurved spur; anterior petal rotund, transversely oblong, the lateral petals united into a single 3-lobed piece.

Langkani: Curtis No. 1678.

The above description of this very remarkable species is chiefly copied from Sir Joseph Hooker.

2. IMPATIENS GRIFFITHII, Hook. fil. and Thoms. in Journ. Linn. Soc. IV, 120: Fl. Br. Ind. I, 445. Herbaceous; stem a foot or more in height, erect, terete, sparsely puberulous. *Leaves* linear-lanceolate, much narrowed towards the base, those in the lower part of the stem in pairs, opposite and petiolate; those in the upper part narrower, in whorls of three and sessile; all remotely serrate-toothed, 1·5 to 4 in. long; the texture rather thick, the lower surface pale and glabrous, the upper sparsely hairy. *Pedicels* solitary, rarely paired, slender,

1 in. or more in length. *Flowers* 1 in. in diam., flattish, rose-lilac. *Sepals* ovate-oblong, acuminate: standard broadly obcordate with a filiform spur behind, the wings broadly bi-lobed. *Capsule* elliptic, turgid in the middle.

Malacca: on Mount Ophir, Gerai, &c.; Griffith, Maingay.

3. IMPATIENS CHINENSIS, Linn. Herbaceous: stem 4 to 18 in. long, suberect, decumbent and rooting at the base, angled. *Leaves* subsessile, varying from linear-oblong to obovate or almost rotund, acute or obtuse, sharply serrate, always opposite, the base acute or rounded, often auricled; texture rather thick, glaucous beneath, glabrous or sparsely hairy, ·5 to 4 in. long: stipules setaceous, glandular, recurved. *Flowers* ·5 to 1 in. in diam., flattish, purple, or white. *Pedicels* solitary or fascicled, sometimes longer than the leaves. *Sepals* linear: standard orbicular, the wings semi-obovate, entire, auricled at the base; spur slender, long, incurved. *Capsule* ·5 to ·75 in. long, elliptic, turgid in the middle.

Malacca; Griffith. DISTRIB. China, British India.

6. HYDROCERA, Blume.

A glabrous erect marsh herb. *Leaves* narrow, alternate. *Flowers* in short axillary 1–2-flowered peduncles, irregular. *Sepals* 5, coloured, imbricate; 2 outer lateral, flat; posticous one produced into a short hollow spur. *Petals* 5, the anticous outer, very large, concave. *Disc-glands* 0. *Stamens* 5; filaments short, flat; anthers slightly cohering around the pistil. *Ovary* 5-celled; stigmas 5, sessile; ovules 2–3 in each cell. *Drupe* baccate, endocarp bony, truncate, 5-celled, cells 1-seeded. *Seeds* curved, corrugated, albumen 0; cotyledons plano-convex, thickish, radicle short, superior.—DISTRIB. One tropical Asiatic species.

1. HYDROCERA TRIFLORA, W. & A. Prod. I, 140. Annual; the stem often floating, fistular, often flexuose and rooting at the nodes; branches erect, 1 to 2 feet long, 5-angled. *Leaves* linear-lanceolate, serrate, attenuated into a petiole at the base, stipulate, glands two. *Flowers* 1 in. in diam., red white and yellow. *Drupe* globose, ·75 in. in diam., smooth, red, when dry 5-angled and truncate. Hook. fil. Fl. Br. Ind. I, 483; Miq. Fl. Ind. Bat. I, Pt. 2, 132; H. f. & T. in Journ. Linn. Soc. iv. 156. *H. angustifolia*, Blume Bijd. 241. *Impatiens triflora*, Linn. DC. Prodr. i. 687; Wall. Cat. 4756. *I.? natans*, Willd.; DC. Prodr. i. 687; Roxb. Fl. Ind. i, 652; Wall. Cat. 4755. *Tytonia natans*, G. Don, Gen. Syst. i. 749. *Balsamina angustifolia*, Burm. Thes. Zeyl. t. 16 fig. 2 (*inaccurate*).

In all the Provinces except the Andaman and Nicobar Islands. DISTRIB. Malayan Archipelago, British India, Ceylon.

ORDER XXIII. RUTACEÆ.

Trees or shrubs, rarely herbs, abounding in pellucid glands filled with essential oil. *Leaves* opposite or alternate, simple or compound, exstipulate. *Flowers* in axillary or terminal cymes or panicles, never spiked, usually bisexual and regular in the Indian species. *Calyx* of 4–5 small lobes or sepals. *Petals* 4–5, hypogynous (in the Indian genera), valvate or imbricate. *Stamens* 4–5 or 8 or 10, rarely more (*Citrus*, *Ægle*); filaments usually free, hypogynous; anthers 2-celled, opening inwards. *Disc* within the stamens, crenate or lobed, sometimes large or long. *Ovary* of 4–5 free or connate carpels; styles as many, free or variously united; stigmas terminal, entire or lobed; ovules usually 2 in each cell. *Fruit* a capsule, berry or drupe, or 1–4 capsular cocci. *Seeds* usually solitary in the cells, testa various, albumen fleshy or 0: embryo straight or curved, radicle superior.—DISTRIB. Tropical and extratropical. Genera 83, and about 70 species.

Ripe fruit separating into dehiscent cocci or follicles.

Flowers generally unisexual; disc free or absent; ovaries partially united; styles basilar or ventral, free at the base; cells 2-ovuled.

Leaves opposite.

Stamens 4 or 5 ... ... 1. *Evodia*.

Stamens 8, four perfect opposite the sepals, alternating with four imperfect opposite the petals... 2. *Tetractomia*.

Stamens 8, all perfect ... 3. *Melicope*.

Leaves alternate, stamens 3 to 5 ... 4. *Zanthoxylum*.

Ripe fruit indehiscent.

Flowers polygamous: petals 4, stamens 8; disc free: ovaries and styles 4, united, the cells 2-ovuled; fruit syncarpous, 4-celled, indehiscent, seed albuminous; leaves 1-foliolate ... ... 5. *Acronychia*.

Flowers hermaphrodite, petals and stamens free or connate, ovaries and styles completely united, cells 1-to many-ovuled: fruit a berry, sometimes with but little pulp, seed exalbuminous

Unarmed.

Style short, persistent; leaves 1 to 5-foliolate ... ... 6. *Glycosmis*.

Style deciduous, leaves pinnate.
  Cotyledons leafy, crumpled; petals valvate; filaments linear-subulate, not dilated at the base ... ... 7. *Micromelum.*
  Cotyledons fleshy, plano-convex, petals imbricate.
    Filaments not dilated at the base... ... 8. *Murraya,*
    Filaments dilated at the base ... ... 9. *Clausena.*
Armed; leaves 3-to 8-foliolate.
  Calyx 3-lobed, petals 3, stamens 6 10. *Triphasia.*
  Calyx cup-shaped, entire or obscurely lobed: petals 4, stamens 8 to 10 ... ... 11. *Luvunga.*
Armed or unarmed; leaves 1-foliolate.
  Anthers linear-oblong, disc cylindric forming a gynophore ... 12. *Paramignya.*
  Anthers ovate-oblong, sometimes cordate, the filaments free or conjoined into a tube; disc cupular ... ... 13. *Atalantia.*

1. EVODIA, Forst.

Trees or shrubs, unarmed. *Leaves* opposite, simple or 1–3-foliolate or imparipinnate, quite entire. *Flowers* small, in panicled axillary cymes, unisexual. *Sepals* 4–5, imbricate. *Petals* 4–5, sessile, valvate or slightly imbricate. *Stamens* 4–5, inserted at the base of the disc, filaments subulate, anthers oblong. *Ovary* deeply 4-lobed, 4-celled; style basilar, stigma 4-lobed, ovules 2 in each cell, collateral or superposed. *Fruit* of 2 to 4 coriaceous 1 to 2-seeded cocci; endocarp horny, elastic. *Seeds* oblong or globular, testa bony or crustaceous, shining; hilum linear, albumen fleshy; embryo straight, cotyledons ovate.—DISTRIB. About 25 species, natives of tropical Asia, the Pacific, the E. African Islands, and Australia.

Leaves 3-foliolate.
  Leaflets usually more or less obovate: cymes broad pyramidal or corymbose, much branched.
    Lower surface of leaflets pubescent... 1. *E. latifolia.*

Lower surface of leaves glabrous.

Apices of leaflets acuminate or apiculate, main nerves rather faint, sub-horizontal or slightly ascending; cymes pyramidal... 2. *E. Roxburghiana.*

Apices of leaflets shortly and abruptly acuminate, main nerves rather faint, sub-horizontal or ascending, cymes corymbose ... ... 3. *E. glabra.*

Apices of leaflets obtuse, nerves very prominent beneath, cymes corymbose ... ... 4. *E. robusta.*

Leaflets oblong or elliptic-oblong, not at all obovate, tapering little to the ends: ripe cocci ·4 in. long ... ... 5. *E. macrocarpa.*

Leaflets oblong-elliptic, tapering to each end: cymes few-branched, very tomentose: flowers in globular masses ... 6. *E. pilulifera.*

Leaflets oval to elliptic, obtuse or sub-acute, very coriaceous, the edges revolute when dry: cymes small, flowers ·25 in. long ... ... 7. *E. pachyphylla.*

Leaves 1-foliolate ... ... 8. *E. pedunculosa.*

1. EVODIA LATIFOLIA, DC. Prod. I., 724. A tree 15 to 20 feet high: young branches stout, obscurely 4-angled, flattened at the nodes, rusty or tawny-puberulous. *Leaves* 3-foliolate, membranous, the petiole 4 to 6 in. long, usually angled, puberulous; leaflets obovate-elliptic to elliptic, acute or shortly acuminate, the base cuneate; main nerves 13 to 18 pairs, spreading, curving, prominent beneath; upper surface glabrescent or glabrous except the tomentose midrib and nerves, the lower softly pubescent, sometimes becoming glabrescent when old; length 5 to 9 in., breadth 2·5 to 4·5 in. (the middle one usually the largest); petiole ·2 to ·4 in. *Cymes* axillary, broad, with opposite spreading rusty-tomentose branches on stoutish puberulous peduncles 1 to 2 in. long. *Flowers* less than ·1 in. long, densely crowded; sepals sub-acute, pubescent outside; petals glabrous except a few hairs on the back outside; ovary villous. *Cocci* 2 or 3 from each flower, broadly ovate, blunt, sub-glabrous, 1–2-seeded: seed black. Hook. fil. Fl. Br. Ind. I., 489; Miq. Fl. Ind. Bat. i. pt. 2, 672; Ann. Mus. Lugd. Bat. iii, 244. *Zanthoxylum Rumphianum*, Cham. in Linnæa v. 58.

In all the provinces, except the Andamans and Nicobars: DISTRIB. Malayan Archipelago.

In its flowers and fruit this closely resembles *E. Roxburghiana*, Benth., but the leaves are different.

2. Evodia Roxburghiana, Benth. Flora of Hong-Kong, 59. A small tree; branches glabrous, opposite. *Leaves* glabrous, 3-foliolate, the petiole 2 to 5 in. long, terete; leaflets thinly coriaceous, shortly petiolulate, obovate, oblanceolate or oblong, the apex rounded acuminate or apiculate: main nerves 12 to 18 pairs, horizontal or slightly ascending, not prominent; length 2·5 to 6 in., breadth 1·25 to 3·25 in., the middle leaflet the largest; petiolule ·15 to ·25 in. *Cymes* pedunculate, spreading; the branches opposite, minutely bracteolate at the base: peduncles 2 to 3 in. long: cymes about 2·5 to 3 in. in diam. *Flowers* densely crowded, whitish, ·1 to ·15 in. long; the anthers exserted, shortly pedicelled, sepals very obtuse, ovary pubescent. *Cocci* about 2 from each flower, ovoid, pointed, 1-to 2-seeded, ·2 to ·3 in. long. *Seeds* black, shining. Hook. fil. Fl. Br. Ind. I, 487; Kurz Fl. Burm. I, 180. *E. triphylla*, Bedd. Flor. Sylvat; Anal. Gen. xli. t. vi. f. 2. *E. Marambong*, Miquel Ann. Mus. Bot. iii. 244. *Fagara triphylla*, Roxb. Fl. Ind. i. 416 (? of Linn.). *F. Lunur-ankenda*, Gærtn. Carp. i., 334, t. 68. f. 9. *Xanthoxylon triphyllum*, Wight Ic. t. 204; Ill. i. 169; Grah. Cat. Bomb. Pl. 36; Dalz. & Gibs. Bomb. Flor. 45. *X. Roxburghianum*, Cham. in Linnæa v. 58. *X. zeylanicum*, DC. Prodr. i., 728. *X. nilagiricum*, Miquel Herb. Hohenack.

In all the Provinces: common. Distrib. Malayan Archipelago, British India.

A widely distributed species very common in most parts of the Malayan Peninsula, and varying a good deal in the size of the leaves and in the degree of density of the cymes. In some cases the latter are lax and open, but in the majority they are condensed. There is some doubt as to what name this plant should bear. Sir Joseph Hooker (F. B. I. l. c.) has written an excellent note on its synonymy which should be consulted. The species, except in the matter of size, differs very little from *E. triphylla.* DC.

3. Evodia glabra, Blume Bijdr. 245. A tree 40 to 70 feet high: young branches stout, compressed at the nodes, glabrous. *Leaves* 3-foliolate; the petioles 2 to 4 in. long, glabrous, terete, grooved in front towards the apex: leaflets more or less coriaceous, shortly petiolulate, obovate or obovate-elliptic, shortly and abruptly acuminate, rarely obtuse, always tapering much to the base, upper surface shining, the lower glabrous or puberulous: main nerves 10 to 15 pairs, oblique or sub-horizontal, prominent on the lower surface and often depressed on the upper when dry; length 4 to 10 in., breadth 2·25 to 5 in., petiolule ·2 to ·4 in., the middle leaflet the largest and with the longest petiolule.

Cymes pedunculate, corymbose, the main branches ascending, the secondary spreading, all opposite, minutely bracteolate at the base, puberulous or almost glabrous; peduncles stout, compressed, glabrescent, 1·5 to 4 in. long. *Flowers* ·1 in. long (excluding the exserted stamens) densely crowded, many of them practically unisexual, the ovary being abortive. *Sepals* sub-orbicular, obtuse, puberulous. *Petals* glabrous. *Stamens* exserted. *Ovary* depressed, glabrous, or hairy at the base of the styles. *Cocci* 2 or 3 to each flower, ·2 in. long, rugulose and glandular externally, broadly ovate, obtuse. *Seeds* black. Miq. Fl. Ind. Bat. I, Pt. 2, 672; Ann. Mus. Lugd. Bat. III, 243; Hook. fil. Fl. Br. Ind. I, 489.

Perak: very common. Penang, Curtis, No. 2485. Andaman Islands, King's collectors. Nicobars, Kurz.

This is best distinguished from *E. Roxburghiana* and *E. latifolia* by its more coriaceous leaves with stronger nerves, and by its more corymbose cymes. The flowers, however, are very little different in all three, and it seems doubtful whether it would not be better to treat all as forms of a single widely distributed and variable species.

4. EVODIA ROBUSTA, Hook fil. Fl. Br. Ind. I., 488. A small tree; young branches as thick as a swan's quill, compressed, hoary. *Leaves* 3-foliolate, the petiole 4 in. long, terete, as thick as a crowquill: leaflets coriaceous, elliptic, the terminal sub-obovate, obtuse or obtusely acuminate, the midrib and arching nerves very strong, glabrous except the puberulous midrib beneath, the upper surface shining; length 6 to 8 in. *Cymes* broad, (5 in. in diam.), brachiate, their branches very robust. *Flowers* and fruit as in *E. Roxburghiana*.

Penang; Phillips. Singapore; Maingay (Kew Distrib.) No. 278.

This species must come very near *E. glabra*, Bl. It also greatly resembles the Sumatran *E. euneuron*, Miq. (Fl. Ind. Bat. Suppl. 532).

5. EVODIA MACROCARPA, King, n. sp. A tree 20 to 40 feet high: young branches rather stout, cinereous-puberulous, compressed. *Leaves* 3-foliolate, the petiole 3 to 4 in. long, glabrous: leaflets coriaceous, oblong, or elliptic-oblong, acute, narrowed to the slightly unequal-sided base; both surfaces glabrous, the upper shining, the lower dull and paler when dry; main nerves 14 to 18 pairs, almost horizontal, faint; length 6 to 12 in., breadth 2 to 3 in., petiole ·1 to ·2 in.; the middle leaflet the largest. *Cymes* axillary, pyramidal, shortly pedunculate, olivaceous-tomentose; the branches opposite, spreading, bracteolate at the base; peduncles ·5 to 1·5 in. long, puberulous. *Flowers* ·1 in. long, densely crowded, many of them with perfect stamens but an abortive ovary; sepals triangular, acute, pubescent; petals puberulous. *Stamens* exserted. *Ovary* villous. *Cocci* 3 or 4 to each flower, compressed, obovate, blunt, ·4 in. long, dark-coloured and

puberulous externally, lined inside with dense white hairs: seeds 2, black, shining.

Perak: Wray, No. 2618 and 3266; King's collector, No. 7489.

A very distinct species, recognisable at once by its long and comparatively large leaflets, small cymes, and large cocci.

6. EVODIA PILULIFERA, King n. sp. A shrub 10 to 15 feet high: young branches rather slender, flattened at the nodes, minutely tawny-tomentose, the bark pale. *Leaves* 3-foliolate, the petiole 3 to 4·25 in. long, terete, grooved in front, deciduously tawny-tomentose; leaflets thinly coriaceous, petiolulate, oblong-elliptic, tapering to each end, the apex shortly acuminate, the base very narrow; both surfaces glabrous, the lower paler when dry: main nerves 9 or 10 pairs, oblique, interarching boldly well within the edge, prominent on the lower, depressed on the upper surface when dry; length 3·5 to 8 in,; breadth 1·25 to 2·75 in.; petiolule ·15 to ·4 in., the middle leaflet rather larger than the lateral. *Cymes* everywhere tawny-tomentose, axillary, on long peduncles; the branches few, opposite, each bearing towards the apex a few dense sub-globose masses of flowers. *Flowers* less than ·1 in. long. *Sepals* ovate, acute, densely tawny-tomentose. *Petals* glabrous. *Ovary* villous. *Cocci* slightly compressed, ovoid, blunt, minutely tawny-tomentose outside, the interior glabrous, ·2 in. long. *Seed* solitary, shining.

Perak: Scortechini, No. 360; Wray, No. 2995; King's collector, No. 6275.

This species is readily distinguished by its minutely tomentose few-branched cymes, each bearing a few densely crowded heads of small flowers.

7. EVODIA PACHYPHYLLA, King n. sp. A small tree 10 to 15 feet high; young branches flattened at the nodes, minutely rufous-tomentose, as are the petiole, under surfaces of the midribs and peduncles of the cymes. *Leaves* 3-foliolate, the petiole 2·5 to 3 in. long: leaflets very coriaceous, oval to elliptic, obtuse or sub-acute, the base slightly cuneate, the edges revolute when dry; upper surface glabrous, shining, the lower pale, glaucous; main nerves 8 to 12 pairs, sub-horizontal, curving slightly, interarching within the edge, slightly prominent on the lower surface when dry, the midrib very bold; length 2·25 to 3·75 in., breadth 1·2 to 2·25 in., petiolule ·35 to ·5 in. *Cymes* axillary, pedunculate, the branches few, short, close together; peduncles 1 to 1·5 in. long. *Flowers* 25 in. long, in dense sub-globular masses. *Sepals* broadly ovate, acute, olivaceous-tomentose externally, glabrous internally. *Petals* erect, ovate-lanceolate, pubescent on both surfaces, the edges glabrous. *Stamens* not exserted. *Ovary* glabrous. *Cocci* 2 or 3 from each flower, sub-compressed, ovate, blunt, pale and puberulous externally, glabrous within. *Seed* solitary, black, shining.

A very distinct species, at once distinguishable by its small coriaceous leaflets and large flowers and fruits.

8. EVODIA PEDUNCULOSA, Hook. fil. Fl. Br. Ind. I, 489. A small tree? young branches cylindric, smooth. *Leaves* 1-foliolate; petiole rather stout, half-cylindric, ·5 to 1 in. long. *Leaflets* coriaceous, obovate, abruptly narrowed at the obtuse apex, the base cuneate: both surfaces glabrous, minutely reticulate, main nerves numerous, slender, spreading, length 4 to 5 in. *Cymes* pedunculate, pubescent, branching near the apex into small trichotomous pubescent cymules; peduncles 1 to 4 in. long. *Flowers* (buds only seen) ·1 in. long, shortly pedicelled. *Sepals* rounded. *Petals* broadly ovate, acute, glabrous. *Ovary* 4-cleft, immersed in the disc.

Singapore; Lobb.

Known only from Lobb's solitary and imperfect specimen.

2. TETRACTOMIA, Hook. f.

Trees or shrubs. *Leaves* opposite, petioled, 1-foliolate, coriaceous, quite entire, punctate. *Flowers* small, in axillary branched cymes. *Calyx* small, 4-partite. *Petals* 4, triangular-ovate, acute, persistent, valvate. *Disc* broad, glandular, flattish or pulvinate, obtusely 4-angled. *Stamens* 4 or 8, (4 perfect alternate with the petals, 4 smaller with imperfect anthers opposite the petals and partially adnate to them at the base); filaments subulate, flattened at the base; anthers 2-lobed, dorsifixed. *Ovary* immersed in the centre of the disc, 4-celled, with 4 free projecting lobes; styles 4, free at the base, connate above; stigma capitate, obscurely 4-lobed; ovules 2, collateral in each cell. *Fruit* of 4 coriaceous, laterally compressed, oblong, 2-seeded cocci, splitting ventrally, the horny endocarp partially separating. *Seeds* inserted towards the base of the carpels.—DISTRIB. Three species, natives of the Malayan Peninsula and Borneo.

Leaves elliptic-obovate, 6 to 9 in. long; flowers ·25 in. long: ripe cocci ·5 in. long ... 1 *T. majus.*
Leaves usually cuneate-obovate, rarely elliptic-obovate, 2·5 to 5 in. long; flowers 1·3 in. long; ripe cocci ·25 in. long ... ... 2 *T. Roxburghii.*

1. TETRACTOMIA MAJUS, Hook. fil. Fl. Br. Ind. I. 491. A tree: young branches stout; their bark brown, rough. *Leaves* very coriaceous, obovate, elliptic, obtuse, narrowed to the base; both surfaces glabrous, very pale when dry: main nerves 12 to 16 pairs, rather straight, oblique, interarching far from the margin, slightly promiment or both surfaces when dry; length 6 to 9 in., breadth 3 to 4 in., petiole 2 to 2·25 in., stout, terete, slightly swollen at base and apex.

Cymes glabrous or glabrescent, 4 to 6 in. in diam., the branches opposite; bracts minute, persistent. *Flowers* ·25 in. in diam., glabrous. *Stamens* 4, perfect; the *filaments* longer than the petals and style, the 4 staminodes minute. *Ripe cocci* about ·5 in. long, keeled. *Seeds* oblong, the nucleus basal, much smaller than the oblong wing. *Tetramerista paniculata*, Kurz in Journ. Bot for 1875, p. 333.

Malacca; Maingay (Kew Distrib.) No. 290.

A rare plant known only by Maingay's scanty specimens.

2. TETRACTOMIA ROXBURGHII, Hook. fil. Fl. Br. Ind. I., 491. A tree 30 to 80 feet high; young branches rather stout, glabrous, their bark pale, rough. *Leaves* coriaceous, cuneate-obovate, sometimes obovate-elliptic, the apex always broad and rounded, and very shortly and bluntly apiculate, much narrowed to the petiole; both surfaces glabrous, rather pale when dry, the upper glabrous, the lower glabrescent with numerous and rather large black dots: main nerves 7 to 9 pairs, oblique, straight, not prominent: length 2·5 to 5, rarely 6 in., breadth 1·5 to 2·5, rarely 3 in.; petiole ·5 to 1 in., rarely 1·25 in. *Cymes* glabrous in the lower, pubescent in the upper part, 3 or 4 in. in diam., pedunculate; bracts minute, persistent. *Flowers* ·13 in. in diam., puberulous. *Stamens* 8, the alternate row imperfect, minute and attached to the petals. *Ripe cocci* 1 to 3 from a flower, about ·25 in. long. *Seeds* oblong, nucleus rather shorter than the wing, Hook. fil. Icones Plantar. 1512. *Melicope tetrandra*, Roxb. Fl. Ind. II. 257.

Penang, Singapore, Perak.

A much more common plant than the last, with smaller flowers and fruit, and with leaves not only smaller but much more obovate.

3. MELICOPE, Forst.

Shrubs. *Leaves* opposite (in the Indian species), 1–3-foliolate, pellucid-punctate. *Flowers* small, in axillary cymes or panicles. *Calyx* 4-lobed or 4-partite. *Petals* 4, sessile, spreading, valvate or imbricate. *Disc* large, entire or 8-lobed, or obsolete. *Stamens* 8, inserted at the base of the disk, those opposite the petals shorter, filaments subulate or flattened; anthers oblong or cordate. *Ovary* 4-celled, deeply 4-lobed; style basilar, or styles 4, subterminal, more or less combined; stigma capitate, 4-lobed; ovules 2 in each, all collateral or superposed. *Fruit* of 4 free spreading coriaceous cocci, dehiscing on the inner face; endocarp more or less separating from pericarp. *Seeds* oblong, testa black, shining; embryo with large oblong cotyledons and short radicle. DISTRIB. chiefly Polynesian: species about 15.

1. MELICOPE HELFERI, Hook. fil. Fl. Br. Ind. I, 492. A glabrous

diœceous shrub: young branches rather stout, striate, sub-quadrangular. *Leaves* 1-foliolate: leaflet coriaceous, obovate-elliptic, very obtuse, narrowed to the base: main nerves about 9 pairs, spreading, inconspicuous; length 4·5 to 6 in., breadth 2 to 3 in; petiole ·75 to 1 in. *Panicles* not much longer than the petioles, few-branched, cymose. *Flowers* ·2 in. in diam. *Calyx-lobes* acute. *Petals* longer than the calyx, lanceolate, acute, puberulous outside, ridged along the midrib on the inner surface inside. Kurz For. Flora Burmah, I, 182.

Andaman Islands; Helfer (Kew. Distrib.) No. 1192.

4. ZANTHOXYLUM, Linn.

Shrubs or trees, often armed with stout prickles. *Leaves* alternate, 3-foliolate or unequally pinnate; leaflets opposite or alternate, entire or crenate, often oblique, punctate. *Flowers* small, in axillary or terminal, peduncled, broad or narrow cymes, white, pink, or greenish, often unisexual. *Calyx* 3–8-fid, rarely 0. *Petals* 3–5, rarely 0, imbricate or induplicate-valvate. *Disc* small or obscure. *Stamens* 3–5, hypogynous or reduced to scales in the ♀. *Ovary* rudimentary in the ♂, in the ♀ of 1–5 oblique, 1-celled carpels; styles sublateral, free or connate above, stigma capitate; ovules 2 in each cell, usually collateral. *Fruit* of 1–5, globose, coriaceous or fleshy, 1-seeded cocci, dehiscing ventrally; endocarp horny, separating or not. *Seed* oblong and compressed, or globose, often hanging out of the carpel, hilum broad, testa bony or crustaceous, blue or black, shining, albumen fleshy; embryo axile, straight or curved; cotyledons flat, radicle very short.—DISTRIB. About 80 species, all either tropical or subtropical.

Unarmed or very slightly armed: leaves 3-foliolate; cymes axillary and terminal; fruit ·3 in. in diam. ... ... 1. *Z. ovalifolium.*
Armed; leaves pinnate, leaflets 4 to 9 pairs; cymes terminal; fruit ·12 in. in diam. ... 2. *Z. myriacanthum.*

1. ZANTHOXYLUM OVALIFOLIUM, Wight Ill. I, 169. A shrub or tree: young branches at first puberulous but speedily glabrous, lenticellate, unarmed, or with a few short straight prickles. *Leaves* 3-foliolate: petiole 1·25 to 2·5 in., not armed; leaflets sub-coriaceous, elliptic-oblong, slightly obovate, the apex with an abrupt short obtuse point, the edges crenulate, the base narrowed; both surfaces shining: main nerves 10 to 14 pairs, sub-horizontal, not much more prominent than the intermediate nerves; length 2 to 5 in., breadth 1·2 to 2·5 in.; petiole ·2 to ·4 in., sometimes almost absent; the middle leaflet larger than the two lateral. *Cymes* slender, paniculate, pedunculate, axillary and terminal, shorter than the leaves, with few alternate branches,

puberulous when young, speedily glabrous. *Flowers* 4-to 5-merous, ·12 to ·2 in. in diam., pedicellate. *Petals* valvate. *Fruit* solitary, sub-globular, ·3 in. in diam., pitted, glabrous. *Seed* sub-globose. Hook. fil. Fl. Br. Ind. I, 492. *Z. undulatum*, Wall. Cat, 1208. *Z. lucidum*, Wall. Cat. 1212. *Toddalia mitis*, Miq. MSS. *Limonia leptostachya*, Jack MSS. Wall. Cat. (without name) 7472 and 7469.

Singapore: Wallich. Andaman Islands, King's collectors. DISTRIB.: British India, Sumatra.

2. ZANTHOXYLUM MYRIACANTHUM, Wall. Cat. 1214. A glabrous tree 40 feet high, all parts except the petioles armed with short straight prickles. *Leaves* 1 to 1·5 feet long; leaflets 4 to 9 pairs, coriaceous, oblong-lanceolate, acuminate, entire or very obscurely and minutely crenate; main nerves about 8 pairs, spreading, not prominent even when dry; length 3 to 4 in., breadth 1·25 to 1·5 in., petiolule ·1 to ·2 in. *Cymes* terminal, pedunculate, spreading, 6 to 8 in. in diam.; peduncle armed, 5 or 6 in. long; branches long, sub-opposite or alternate. *Flowers* ·2 in. in diam., sub-sessile, 5-merous. *Calyx* with a few small bracts at the base. *Ovaries* 3. *Ripe fruit* compressed, ·12 in. in diam., apiculate. *Seed* compressed. Hook. fil. Fl Br. Ind. I, 496. *Z. longifolium*, Wall. Cat. 7115.

Penang: Porter, Curtis No. 1076. Malacca; Maingay (Kew Distrib.) No. 279.

There are in Scortechini's Herbarium some scraps of a *Zanthoxylum* which appears to be *Z. glandulosum*, Teysm. and Binn.; but without better specimens I hesitate to include that species here.

5. ACRONYCHIA, Forst.

Trees, with opposite or alternate, 1-rarely 3-foliolate leaves; leaflets entire. *Flowers* polygamous, small or moderately sized, yellow, in pedunculate, terminal, or axillary corymbs. *Petals* 4, valvate, spreading, revolute. *Stamens* 8, inserted under a thick, 8-angled, tomentose disc; filaments subulate, the alternate longer. *Ovary* inserted in the hollowed apex of the disc, tomentose, 4-celled. *Style* terminal; stigma 4-grooved; ovules 2 in each cell, superposed. *Fruit* a 4-celled drupe, or 4-valved loculicidal capsule. *Seeds* with black testa and copious albumen; embryo straight; cotyledons flat, oblong. DISTRIB. About 15 species: all tropical Asiatic or Australasian.

Flowers ·35 to ·75 in. in diam., linear in bud,
  filaments villous, inflorescence cymose ... 1. *A. laurifolia.*
Flowers ·15 in. in diam., globular in bud,
  filaments glabrous, inflorescence racemose ... 2. *A. Porteri.*

1. ACRONYCHIA LAURIFOLIA, Blume Bijdr. 245. A small tree or

shrub; young branches puberulous, speedily becoming glabrous. *Leaves* sub-opposite, 1-foliolate; leaflet thinly coriaceous, oblong, elliptic or sub-obovate, obtusely acuminate or obtuse, the base much narrowed; both surfaces glabrous, shining, reticulate: main nerves little more prominent than the secondary, 14 to 18 pairs, forming a double series of loops within the edge; length 2 to 6 in., breadth 1·1 to 2·4 in., petiole ·5 to ·75 in. *Cymes* axillary, slender, long-peduncled, corymbose, the branches opposite, bracts and bracteoles minute. *Flowers* linear in bud, when open ·35 to ·75 in. in diam., pale yellow. *Sepals* small, semi-orbicular, short. *Petals* linear-oblong, obtuse, widening at the base, revolute, more or less villous on the inner surface. *Filaments* villous below. *Ovary* villous, style short, stigma capitate. *Drupe* sub-globular to ovoid, with an angular apiculus, sometimes narrowed at the base and occasionally lobed, 4-angled when dry, from ·25 to ·4 in. long, 3- or 4-celled. Hook. fil. Fl. Br. Ind. I, 498; Miq. Fl. Ind. Bat. I, pt. 2, 668; Kurz For. Flora Burmah, I, 184. *A pedunculata*, Miq. Fl. Ind. Bat. Suppl. 532: Ann. Mus. Lugd. Bat. III, 245; Thwaites Enum. Pl. Ceyl. 409. *Cyminosma pedunculata* DC. Prod. I., 722: Thwaites Enum. Pl. Ceyl. 69: Wall. Cat. 1205. W. & A. Prod. 147; Wight Ill. I, 165, t. 65; Dalz. & Gibs. Fl. Bombay, Suppl. 17. *C. Ankenda*, Gærtn. Fruct. I, 280, t. 58. *Clausena simplicifolia*, Dalz. in Kew Journ. Bot. III, 180. *Jambolifera pedunculata*, Vahl Symb. III, 52, fig. 61. *Gela lanceolata*, Lour. Fl. Coch. I, 232. *Selas lanceolatum*, Spreng. Syst. II, 216. *Ximenia ? lanceolata*, DC. Prod. I, 533. Wall Cat. *indeterm.* 9028.

In the Andaman and Nicobar Islands. DISTRIB. British India and Ceylon, Malayan Archipelago, Cochin China.

A widely distributed and variable species, of which Sir Joseph Hooker (Fl. Br. Ind. I, 498) recognises six varieties. Of these, however, only two occur in the Malayan Peninsula, the only very well marked form being (6) with flowers 1 in. in diam. and subglobose, fruit nearly 7 in. in diam.; and (5) with small fruit lobed at the apex.

2. ACRONYCHIA PORTERI, Hook. fil. Fl. Br. Ind. I, 498. A tree 15 to 30 (or even 50) feet high: young branches glabrous, pale. *Leaves* opposite or alternate, 1-foliolate; leaflet coriaceous, oblong, slightly obovate, usually acute or shortly acuminate, sometimes obtuse, the base much narrowed: both surfaces glabrous dull and opaque: main nerves 8 to 10 pairs, straight, oblique, slightly prominent beneath when dry; length 3 to 8 in., breadth 1·25 to 3 in., petiole ·5 to ·75 in. *Racemes* often several from one axil, sometimes as long as, but usually shorter than the leaves, slender, puberulous towards the apex, minutely bracteolate. *Flowers* ·15 in. in diam., much shorter than their pedicels, in pairs or sub-verticellate, globose in bud. *Sepals* triangular, acute.

Petals broadly ovate-oblong, pubescent inside. *Filaments* glabrous. *Ovary* glabrescent. *Style* very short; stigma large, ob-pyramidal, 4-lobed. *Drupe* ovoid, tapering to each end, 4-angled when dry, minutely pitted, 4-celled, but often only 2-seeded, ·5 in. long and ·3 in. diam. when dry.

Penang: Porter, Maingay (Kew Distrib.) No. 280, Curtis. Malacca: Griffith. Perak: Scortechini, King's collector.

6. GLYCOSMIS, Correa.

Unarmed shrubs or trees. *Leaves* 1-foliolate or imparipinnate; leaflets alternate. *Flowers* small, in axillary, rarely terminal panicles. *Calyx* 4–5-partite, segments broad, imbricate. *Petals* 4–5, imbricate. *Stamens* 8–10, free, inserted round a disc; filaments subulate, dilated below; anthers small, with often a dorsal or apical gland. *Ovary* 2–5-celled; style very short, persistent, stigma simple, ovules solitary and pendulous in each cell. *Berry* small, dry or fleshy, 1–3-seeded. *Seeds* oblong, testa membranous; cotyledons equal, radicle very short.—DISTRIB.—Species 5, Asiatic and Australian.

Ovary glabrous: fruit globular ... ... 1. *G. pentaphylla.*
Ovary hairy: fruit oblong, narrowed at the base ... ... 2. *G. sapindoides.*
Ovary rusty-pilose ... ... 3. *G. puberula.*

1. GLYCOSMIS PENTAPHYLLA, Corr. in Ann. Mus. VI, 384. A glabrous shrub or small tree. *Leaves* 3- to 5-foliolate, or 1-foliolate, leaflets sub-coriaceous, varying from elliptic-lanceolate, lanceolate, oblong, or obovate, or linear-lanceolate to oblong or even obovate; the apex acute, acuminate or obtuse; the edges entire or crenulate; the base narrowed; both surfaces shining; main nerves 4 to 9 pairs, oblique, curving, rather prominent beneath, and depressed above when dry; length 1·5 to 15 in., breadth ·5 to 6 in., petiolule ·1 to ·5 in. *Panicles* cymose, puberulous to glabrous, varying much in size, usually axillary, but often terminal. *Flowers* small. *Ovary* glabrous, 5-celled, rarely 3- to 4-celled: style short, stout. *Berry* globose, white or bluish white, from the size of a pea to that of a cherry. Hook. fil. Fl. Br. Ind. I, 499; Kurz For. Burmah, I, 186: Miq. Fl. Ind. Bat. I, pt. 2, 522: DC. Prodr. i. 538; W. & A. Prodr. 93; Oliv. in Journ. Linn. Soc. v., Suppl. ii. 37; Wall. Cat. 6374; Thwaites Enum. 45 and 406; Dalz. & Gibs. Bomb. Fl. 29; Bedd. in Trans. Linn. Soc. xxv. 211; Flor. Sylv. Anal. Gen. xliii. t. 6, f. 6. *G. chylocarpa*, W. & A. Prodr. 93. *G. arborea*, DC. l. c.; Wall. Cat. 6373; Thwaites Enum. 45. *G. Retzii*, Roem. Synops. fasc. i. 41. *Sclerostylis pentaphylla*, Bl. Bijdr. 135. *Limonia pentaphylla*, Retz Obs. v. 24; Roxb. Cor. Pl. t. 84; Flor. Ind. ii. 381. *L. arborea*, Roxb. Cor.

Pl. t. 85; Fl. Ind. l.c.; Bot. Mag. t. 2074. *Myxospermum chylocarpum*, Roem. Synops. fasc. i. 40.

In all the Provinces: common. Distrib.—Malayan Archipelago, British India, Philippine Islands, Australia.

A very variable and most perplexing species, the Protæan forms of which were first reduced to order by Professor D. Oliver (Journ. Linn. Soc. V, Suppl. II. p. 36). Of the forms recognised by Dr. Oliver only some are found in the Malayan Peninsula and Andaman Islands. Sir Joseph Hooker (in Fl. Br. Ind.) follows Professor Oliver for the most part; and from that book I copy the following account of the varieties. The Calcutta Herbarium is overloaded with specimens of this plant, many of which it is difficult to fit in under any of Professor Oliver's varieties; and for one of these I have ventured to suggest the varietal name *macrorachis*.

Var. 1: Leaves usually 3-, rarely 1- or 5-foliolate; leaflets 4–9 in., lanceolate or oblong, or obovate-lanceolate, quite entire or obscurely crenulate; panicles towards the tips of the branches usually elongate, many-flowered; ovary usually covered with mamillary glands, 5-celled, connate with the disc at the base.—The commonest form in the Malay Peninsula.—Distrib.; British India.

Var. 2: Leaves usually 3–5-foliolate (except sub-var. 1); leaflets elliptic or elliptic-lanceolate; panicles small, few or many-flowered, flowers smaller; ovary 4–5-celled, scarcely mamillate, constricted at the base and thus free from the disc.—*G. triphylla*, Wight in Hook. Bot. Misc. iii. 298, Suppl. t. 39; Ic. t. 167; W. & A. Prodr. 93. *G. nitida*, W. & A. Prodr. l. c.—The commonest form in the Andaman Islands. Distrib.—Western Peninsula, Ceylon, Tenasserim.

Sub-var. 1. *longifolia*: leaves usually 1-foliolate, leaflets 3–10 in., oblong or obovate-lanceolate, often acuminate or even caudate; panicles short, 1–2 in., or if terminal 3–4 in.—Malacca, Assam, the Khasia Mts., Rangoon.

Sub-var. 2. *macrophylla*: Leaves 3–5-foliolate, with the leaflets 3$\frac{1}{2}$–6 in., or 1-foliolate with the leaflets 8 to 12 in. long, by 2·5 to 6 in. broad. *G. macrophylla*, Lindl. in Wall. Cat. 6377, Miq. Fl. Ind. Bat. I, pt. 2 p. 522. *Chionotria rigida*, Jack in Mal. Misc. ex. Hook. Comp. Bot. Mag. I, 155. *Ch. monogyna*, Walp. Rep. I, 382. *Sclerostylis macrophylla*, Bl. Bijdr. 135. Penang. Distrib.—Assam. Tavoy.

Sub-var 3. *macrorachis*, King, leaflets 1-foliolate, oblong-lanceolate, acuminate, 9 to 15 in. long and 3·5 to 5 in. broad: cymes small, pedicellate, arranged on a raceme 4 to 9 in. long. Penang: Curtis No. 89.

2. Glycosmis sapindoides, Lindl. in Wall. Cat. 6376. A shrub. *Leaves* 5-to 7-foliolate; leaflets sub-coriaceous, oblong or lanceolate,

acuminate or sub-acuminate, both surfaces glabrous; main nerves 7 to 9 pairs, oblique, faint: length 3 to 8 in., breadth 1 to 3 in., petiole about ·2 in. *Panicles* cymose, sub-pyramidal, axillary and terminal. *Flowers* shortly pedicelled. *Ovary* 2- to 3-celled, hairy, about as long as the thick style. *Berry* oblong, narrowed to the base, usually 1-seeded. Hook. fil. Fl. Br. Ind. I, 501. *G. cyanocarpa*, Spreng. VAR. *sapindoides*, Kurz in Journ. Bot. for 1876, p. 34.

Penang: Wallich, Maingay, Curtis. DISTRIB.—Sumatra, Java, Sikkim.

I doubt very much indeed whether this would not be better treated as a variety of *G. pentaphylla*, than as a species. Except the hairiness and the smaller number of cells usually found in its ovary, and its oblong fruit, I see nothing to distinguish it.

3. GLYCOMIS PUBERULA, Lindl. in Wall. Cat 6375. A shrub: *leaves* usually 3-foliolate; leaflets sub-coriaceous, ovate to oblong-lanceolate, more or less bluntly acuminate; the base rounded or cuneate, lower surface pale when dry; main nerves about 8 pairs, spreading; length 2·5 to 4·5 in., breadth ·75 to 1·5 in. *Panicles* short, axillary; flowers in short pedicels; disc small, adnate to the 4- to 5-celled oblong rusty-pilose ovary. *Style* very short.

Penang: Singapore, Perak: not common.

Except in its pilose ovary this differs but little from *G. pentaphylla* Corr., of which it would be perhaps well to treat it as a form.

7. MICROMELUM, Blume.

Unarmed trees. *Leaves* imparipinnate; leaflets alternate, oblique. *Flowers* in large terminal corymbose cymes. *Calyx* cupular, 3–5-toothed or lobed. *Petals* 5, free, thick, valvate or subimbricate. *Stamens* 10, free, inserted round a short or long disc; filaments linear-subulate, alternately shorter. *Ovary* 5- rarely 2–6-celled; style constricted at the base, deciduous, stigma obtuse or capitate; ovules 2, superposed in each cell. *Berry* small, dry, usually 1–2-seeded, septa spirally twisted. *Seeds* oblong, testa membranous; cotyledons leafy, crumpled, radicle long.—DISTRIB.—Species 3 or 4: tropical Asiatic and Oceanic.

A large shrub or small tree: fruit glabrous ... 1. *M. pubescens.*
A small shrub, never a tree: fruit pubescent... 2. *M. hirsutum.*

1. MICROMELUM PUBESCENS, Blume Bijdr. 137. A large shrub or small tree; the young parts more or less pubescent or puberulous, the older often glabrescent or even glabrous. *Leaves* 6 to 18 in. long: leaflets 9 to 15, alternate or sub-opposite, membranous, broadly lanceolate to ovate, acuminate, the edges undulate, sub-cuneate or entire; the base cuneate, often very oblique; main nerves 9 to 12

pairs, oblique, not prominent; length 1·5 to 3·5 in., breadth ·5 to 2in. *Cymes* large, terminal, much branched, peduncIate, 4 to 8 in. in diam., many-flowered, minutely bracteolate. *Flowers* ·25 to ·5 in. in diam., on pedicels ·1 to ·2in. long, buds oblong. *Calyx* sub-entire or 5-toothed. *Petals* linear-oblong, sub-acute. *Filaments* alternately longer. *Ovary* mostly pubescent, usually 5-celled. *Berry* ovoid or oblong, ·3 to ·4 in. long, pitted, glabrescent, 1-seeded. Hook. fil. Fl. Br. Ind. I, 501; Kurz For. Flora Burmah I, 186: Oliv. in Journ. Linn. Soc. v. Suppl. ii. 40; Bedd. Flor. Sylv. Anal. Gen. xliii. t. 7, f. 1; Thwaites Enum. 46. *Bergera integerrima*, Roxb. Fl. Ind. ii. 376; Wall. Cat. 6371. *Aurantiacea*, Wall. Cat. 8517, 8518.

In all the Provinces. DISTRIB.—British India, China, the Malayan Archipelago, and Australasia.

2. MICROMELUM HIRSUTUM, Oliver in Journ. Linn. Soc. V. Suppl. II, 40. A shrub, all parts (but especially the inflorescence) more or less tomentose, rarely glabrescent. *Leaves* 6 to 12, rarely 15 in. long; leaflets membranous, 9 to 25, lanceolate or oblong-lanceolate, rarely ovate, shortly acuminate, the edges obscurely serrate, the base often oblique, lower surface softly tomentose; main nerves 5 to 10 pairs, rather prominent beneath: length 1·5 to 3·5 in., breadth ·8 to 1·5 in. *Cymes* terminal, very tomentose, often lax, and 6 to 8 in. in diam., but sometimes condensed and only 2 in. in diam. *Flowers* ·25 in. in diam. *Calyx* deeply 5-lobed, hirsute. *Ovary* villous. *Berry* oblong or obovoid, pubescent, pitted. Hook. fil. Fl. Br. Ind. I, 502; Kurz For. Flora Burmah I, 187: Wall Cat. 8516.

Penang, Singapore, Perak, but not very common. DISTRIB.—British India, Burmah, Philippines.

This is closely allied to *M. pubescens*, but is usually a smaller shrub. The chief differences between the two lie in the greater amount of pubescence in this, and the smaller size of its flowers.

8. MURRAYA, Linn.

Unarmed shrubs or small trees. *Leaves* pinnate; leaflets alternate, petioled, base oblique or cuneate. *Flowers* solitary and axillary, or in terminal corymbs or axillary cymes. *Calyx* 5-fid or partite. *Petals* 5, free, imbricate. Stamens 10, inserted on an elongate disc; filaments subulate, alternately shorter: anthers shortly ovate. *Ovary* 2- to 5-celled, narrowed into the long deciduous style, stigma capitate; ovules solitary, or 2 superposed or collateral in each cell. Berry oblong or ovoid, 1- to 2-celled, 1- to 2-seeded. *Testa of seed* woolly or glabrous; cotyledons fleshy, plano-convex, similar. DISTRIB.—4 species, tropical Asiatic.

1. MURRAYA EXOTICA, Linn. A glabrous shrub or small tree: young branches terete, the bark pale when dry. *Leaves* 4 to 5 in. long, 3-to 8-foliolate; leaflets thinly coriaceous, shining, ovate or ovate-lanceolate, occasionally rhomboid, more or less obtusely acuminate, the apex often notched, edges entire; the base cuneate, often oblique. *Corymbs* terminal, few-flowered. *Flowers* campanulate. *Sepals* acute. *Petals* oblong-lanceolate, white. *Ovary* 2-celled, style slender, stigma capitate, *Berry* ovoid or sub-globose, shining, red when ripe, ·5 in. long, 2-seeded. Hook fil. Fl. Br. Ind. I, 502; Miq. Fl. Ind. Bat. I, Pt. 2 p. 522; Kurz For. Flora Burmah I, 190; Oliver in Jour. Linn. Soc. V, Suppl. II, 28: Roxb. Fl. Ind. II, 374; Blume Bijdr. 1363; Wall. Cat. 6368; Thwaites Enum. 45; Wight Ic. t. 96; Brandis For. Flora N. India, 48. *M. exotica* and *brevifolia*, Thwaites Enum. 45. *M. paniculăta*, Jack in Mal. Misc. I, 31 ex Hook. Bot. Misc. II, 79; DC. Prodr. I, 537; W. & A. Prodr. 94; Dalz. and Gibs. Bomb. Flor. 29. *M. sumatrana*, Roxb. Fl. Ind. II, 375; Wall. Cat. 6369; Miq. Fl. Ind. Bat. l. c. 523. *Chalcas paniculata*, Linn. *Ch. sumatrana*, Roem. Synops. fasc. I, 49. *M. Glenieii*, Thwaites Enum. 406; Oliv. in Journ. Linn. Soc. v. Suppl. II, 29.

Andaman Islands. Malayan Peninsula, Griff. (Kew Distrib.) No. 520. DISTRIB.—British India, China, Australia. Much cultivated in gardens on account of the fragrance of its flowers.

9. CLAUSENA, Burm.

Unarmed shrubs or trees. *Leaves* imparipinnate, usually deciduous, leaflets membranous. *Flowers* small, in terminal or axillary cymes panicles or lax racemes. *Calyx* 4-5-lobed or-partite. *Petals* 4–5, free, membranous, margins imbricate. *Stamens* 8–10, inserted round an elongated disc, the alternate shorter; filaments usually dilated or arched and concave below the subulate tip; anthers short. *Ovary* stipitate, 4–5- (rarely 2–3-) -celled; style usually distinct, deciduous; stigma obtuse, entire or 2–5-lobed; ovules 2, collateral, or superposed in each cell. *Berry* small, ovoid, oblong or globose, 2–5-celled. *Seeds* oblong, testa membranous; cotyledons equal, plano-convex. DISTRIB. Species about 14; chiefly tropical Asiatic, with a few African and Australian.

1. CLAUSENA EXCAVATA, Burm. Fl. Ind. 87. A shrub or small tree: young branches pubescent or tomentose, as are the young leaves and the inflorescence. *Leaves* 6 to 12 in. long; leaflets 15 to 29, membranous, lanceolate to oblong-lanceolate, acuminate, obscurely crenate; the base narrowed, very oblique; the upper surface when adult glabrescent or glabrous; length 1·5 to 3·4 in., breadth ·5 to 1 in.; petiolule ·1 in.. *Panicle* terminal, pyramidal, its length 4 to 12 in, of which the peduncle forms a third; branches spreading, alternate. *Flowers* ·25

in. in diam., with globose buds, 4-merous; pedicels longer than the flowers. *Calyx* much shorter than the oblong glabrous petals. *Ovary* ovoid, slightly 4-angled, hairy, stipitate; style stout, about as long as the ovary. *Fruit* broadly ovoid, blunt at each end, 1- to 2-seeded. Hook. fil. Fl. Br. Ind. I., 504: Miq. Fl. Ind. Bat. I, pt. 2, p, 524: Kurz For. Flora Burmah I, 188; Blume Bijdr. 139; DC. Prodr. I. 538; Oliv. in Journ. Linn. Soc. v. Suppl. ii. 31. *Murraya Burmanni*, Spreng. Syst. Veg. ii. 315. *Amyris sumatrana* and *punctata*, Roxb. Fl. Ind. ii. 250, 251. *Cookia graveolens*, W. & A. Prodr. 95; Wall. Cat. 8515. *Gallesioa graveolens*, Roem. Synops, fasc. i. 45.

In all the provinces except the Andaman and Nicobar islands. DISTRIB.—British India, Malayan Archipelago, near the bases of hill ranges.

10. TRIPHASIA, Lour.

A spiny shrub. *Leaves* alternate, sessile, 3-foliolate; leaflets obtuse, crenate, the lateral smaller. *Flowers* solitary or in 3-flowered cymes, axillary. *Calyx* 3-lobed. *Petals* 3, free, imbricate. *Stamens* 6, inserted round a fleshy disc; filaments free, subequal, dilated at the base, anthers linear. *Ovary* ovoid, 3-celled, narrowed into a slender deciduous style; stigma obtuse or capitate and 3-lobed; ovules solitary in each cell. *Berry* small, ovoid, 1–3-celled, 1–3 seeded. *Seeds* oblong, immersed in mucilage, testa coriaceous; cotyledons plano-convex, often unequal or lobed.

1. TRIPHASIA TRIFOLIATA, DC. Prod. I, 536. A small glabrous spiny shrub. *Leaflets* coriaceous with obscure nerves, crenulate, dissimilar; the terminal one shortly petiolate, ovate, obtuse, retuse, the base cuneate; the lateral smaller, oblique. *Flowers* about ·5 in. long, white. *Petals* linear-oblong. *Fruit* ovoid, apiculate, glandular-dotted. Hook. fil. Fl. Br. Ind. I, 507; Miq. Fl. Ind. Bat. I. pt. 2. p. 519; Kurz For. Flora Burmah, I, 191: Blume Bijdr 132; Oliv. Journ. Linn. Soc. v. Suppl. ii 26; W. & A. Prodr. 91; Dalz. & Gibs. Bomb. Fl., Suppl. 12. *T. aurantiola*, Lour. Fl. Fl Coch. I, 189; Wall. Cat. 6381. *Limonia trifoliata*, Linn.; Burm. Fl. Ind. t. 35, f. 1.; Bl. Bijdr. 132. *L. diacantha*, DC. Prodr. i. 536.

Nicobar Islands: Kurz. DISTRIB. British India and various tropical countries, but often doubtfully wild. It is possible this may not really be indigenous in the Nicobars, as these islands have for ages been frequented by Malayan pirates, who may have inadvertently introduced it.

11. LUVUNGA, Hamilt.

Glabrous, climbing shrubs, usually armed with axillary (often hooked) spines. *Leaves* 3-foliolate; leaflets coriaceous, quite entire.

Flowers in axillary fascicled or panicled racemes. *Calyx* cupular, entire or obscurely 4–6-lobed. *Petals* 4–5, free, linear-oblong, thick, imbricate. *Stamens* 8 or 10, inserted around a cupular annular or elevated disc; filaments equal or not, linear-subulate, free or cuneate; anthers linear or linear-oblong. *Ovary* 2–4-celled; style stout, deciduous, stigma capitate; ovules 2, superposed in each cell. *Berry* large, ellipsoid, with a thick rind, 2–3-seeded. *Seeds* large, ovoid; testa membranous, nerved; cotyledons equal, oblong, fleshy,—DISTRIB. About 4 species: tropical Asiatic.

Leaflets oblong-lanceolate to oblong-oblanceolate; filaments glabrous, united into a tube ... ... 1 *L. scandens.*
Leaflets elliptic, more or less obovate; filaments free, often woolly ... 2 *L. eleutheranthera.*

1. LUVUNGA SCANDENS, Ham. in Wall. Cat. 6382. A large woody climber. *Leaflets* oblong-lanceolate to oblong-oblanceolate, acute or blunt, the base narrowed, nerves very obscure; length 4 to 12 in., breadth 1 to 2 in., petiolules about ·2 in.; petioles terete, stout, 2 to 5 in. long. *Cymes* many-flowered, short, broad, (1·5 to 2 in. across), on short peduncles. *Flowers* ·5 to ·75 in. long, white. *Calyx-lobes* short, obtuse. *Petals* 4, fleshy, recurved. *Stamens* with glabrous filaments united into a tube (sometimes for three-quarters of their length). *Ovary* 3- to 4-celled. *Berry* of the size of a large olive, yellowish, obscurely 3-lobed, the pericarp smooth. Hook. fil. Fl. Br. Ind. I, 509; Kurz For. Flora Burmah I, 191; Wight Ill. i. 108; Oliv. in Journ. Linn. Soc. v. Suppl. ii. 43; Bot. Mag. t. 4522. Pierre For. Flora Coch. Chine, t. 288. *Limonia scandens*, Roxb. Fl. Ind. ii. 380.

Malacca: Maingay (Kew Distrib.) No. 285. DISTRIB. British India.

2. LUVUNGA ELEUTHERANTHERA, Dalz. in Hook. Kew Journ. Bot. II. 258. A woody climber like the last, the spines usually hooked; leaflets elliptic and usually more or less obovate, shortly and abruptly acuminate; main nerves 8 to 12 pairs, slightly prominent. *Cymes* axillary, many- or few-flowered. *Filaments* free, often woolly in the upper part. *Fruit* as in the last. Hook. fil. Fl. Br. Ind. I. 511; Oliv. in Journ. Linn. Soc. v. Suppl. ii. 44; Dalz. & Gibs. Bomb. Flor. 30. *L. tavoyana*, Lindl. in Wall. Cat. 6383. *L. scandens* and *eleutheranthera*, Thwaites, Enum. 47, 48, 406. *Triphasia sarmentosa*, Blume Bijd. 132; Miq. Fl. Ind. Bat. I. pt. 2, p. 520.

Perak: common. Pahang. Penang.—DISTRIB. Malayan Archipelago, W. Peninsula of British India, Ceylon.

This plant differs from *L. scandens* (to which it is closely allied) in having more obovate leaves, with much more distinct nervation, and free filaments which are often woolly. It appears to be pretty widely distributed in Java, and is I think without doubt Blume's *Triphasia sarmentosa.*

12. PARAMIGNYA, Wight.

Erect or climbing shrubs, unarmed, or with axillary spines. *Leaves* 1-foliolate, the joint often obscure, quite entire, subcoriaceous, persistent. *Flowers* rather large, axillary, solitary or fascicled. *Calyx* cupular or small, and 4–5-lobed. *Petals* 4–5, free, imbricate or rarely induplicate-valvate. *Stamens* 8–10, inserted round a columnar disc; filaments free, linear, equal or subequal, anther linear-oblong. *Ovary* 3–5-celled; style elongate, deciduous; ovules in each cell solitary, or 2 obliquely superposed. *Berry* ovoid or subglobose, often contracted at the base, 1–5-seeded, rind thick. *Seeds* large, oblong, much compressed, testa membranous; cotyledons fleshy, equal.—DISTRIB.—Species 6; tropical Indian.

Spines short, solitary, axillary, curved, pubescent; flowers ·7 in. long, on slender pedicels longer than themselves ... ... 1 *P. armata.* VAR. *andamanica.*

Spines long, in pairs, stipular, straight, glabrous; flowers ·35 in. long, on short pedicels ... 2 *P. longispina.*

1. PARAMIGNYA ARMATA, Oliver in Journ. Linn. Soc. V. Suppl. II, 43, VAR. ANDAMANICA, King. A scandent shrub; young branches slender, puberulous, speedily becoming glabrous. *Leaflets* elliptic or elliptic-oblong, sub-acute or acute, the base rounded; glabrous except (when young) the upper surface of the midrib near the base; the reticulations and the 10 to 12 pairs of spreading main nerves slightly prominent on the lower surface when dry, the glandular dots also rather prominent; length 4 to 5·5 in., breadth 1·5 to 2·75 in.; petiole ·5 in., pubescent when young especially on the upper surface. *Spines* short, solitary in the axils below the pedicels, slightly curved, pubescent. *Flowers* axillary, in pairs, on slender sparsely pubescent pedicels longer than themselves; pedicels 1·25 to 1·5 in. long, bracteolate at the base. *Calyx* short, deeply divided into 5 broadly obtuse, spreading lobes. *Petals* about five times as long as the calyx, linear-oblong, obtuse, glabrous, ·6 in. long. *Stamens* 10, free, almost as long as the petals: the filaments rather thick and woolly below, slender and glabrous towards the apex; anthers narrowly oblong. *Disc* short, cylindric; not broader than the ovary. *Ovary* ovoid; style elongate, crowned by the discoid stigma, all glabrous. *Fruit* globular or turbinate, smooth, ·5 to ·65 in. in diam.

Andaman Islands: common.

This differs from the typical *P. armata*, Oliver, as it occurs in

Western Peninsular India and in Ceylon, mainly in the size of its leaves, and in its flowers being less numerous in their axils. In its flowers it agrees well with the typical form. It also resembles *P. monophylla*, W. and A.; but the filaments of the stamens of that species are glabrous or nearly so, and taper suddenly to a short point, while the filaments of this are thick and woolly in the lower three-fourths, the upper fourth being filiform and glabrous. The ovary of this is glabrous, of that pubescent; moreover the flowers of this are on long filiform pedicels which arise by pairs from the axils; while in *P. monophylla* the pedicels are short, and are united above the point of origin from the axil. The calyx of *P. monophylla* is besides longer, but much less deeply lobed; it is also pubescent or tomentose, while the calyx of this is glabrous. The disc in this plant is nothing more than a short gynophore.

2. PARAMIGNYA LONGISPINA, Hook. fil. Fl. Br. Ind. I, 511. A small rigid glabrous tree; branches rather stout, armed with stout straight spines ·75 to 1·5 in. long, and rising from each side of the insertion of the petioles. *Leaves* elliptic-oblong to elliptic, acute or obtuse, the base rounded, nerves indistinct, length 2·5 to 4·5 in., breadth 1·1 to 1·75 in., petiole ·2 in. *Flowers* ·35 in. in diam., axillary, solitary or 2 or 3 together, pedicels short. *Calyx* 5-toothed. *Petals* oblong, obtuse. *Stamens* 10, equal, glabrous; anthers narrow, as long as the filaments, apiculate. *Ovary* glabrous, standing on the disc (gynophore): style stout, cylindric; ovules in pairs. *Fruit* ovoid, much apiculate, 1·25 to 1·75 in. long, glabrous, 3 or 4-celled; the pericarp coriaceous. *Seeds* compressed, beaked. *Atalantia longispina*, Kurz Journ. As. Soc. Bengal, for 1872, pt. 2, p. 295. *Paramignya angulata*, Kurz For. Flora Burmah, I, 194. *Gonocitrus angulatus*, Kurz in Herb. Calc. *Citrus angulata*, Willd.? *Limonia angulata*, W. & A. Prodr. 91; Miq. Fl. Ind. Bat. I, pt. 2. p. 521. Malacca: Maingay (Kew Distrib.) l. c. 286. Perak: Scortechini

DISTRIB.—Burmah.

13. ATALANTIA, Correa.

Unarmed or spinous shrubs or trees. *Leaves* alternate, 1-foliolate, coriaceous, persistent, quite entire or crenulate; stipule-like scales often present at the base of the petioles and spines, which belong to undeveloped leaf-buds. *Flowers* axillary, rarely terminal, fascicled or or in short racemed corymbs, or panicles, rarely solitary. *Calyx* 3–5-lobed or, partite-rarely irregularly split. *Petals* 3-5, free or adnate to the stamens and united with them into a tube, imbricate. *Stamens* 6–8, rarely 15–20, inserted round an annular or cupular disc, filaments free or irregularly connate, subequal or the alternate shorter; anthers short, ovate-oblong, or base cordate. *Ovary* 2- or 4-, rarely 3- or 5- celled: style deciduous, stigma capitate; ovules solitary or 2 collateral in each cell. *Berry* large, sub-globose, 1–5-celled, 1–5-seeded, rind thick. *Seeds* oblong; cotyledons fleshy, plano-convex.—DISTRIB.—Species about 10, chiefly tropical Asiatic.

Armed; leaves 1·25 to 2·5 in. long ... 1. *A. monophylla.*
Unarmed; leaves 4 to 6 in. long ... ... 2. *A. Roxburghiana.*

1. ATALANTIA MONOPHYLLA, Correa Ann. du Mus. VI, 383. A large shrub or small tree: the young branches sometimes pubescent at the very tip, usually more or less armed with short, solitary, straight, axillary spines. *Leaves* lanceolate, oblong-ovate, ovate or elliptic; the apex obtuse, often notched, the edges entire, the base slightly cuneate; both surfaces glabrous, the nerves and reticulations rather distinct when dry; length 1·25 to 2·5 in., breadth ·6 to 1·2 in.; petiole ·2 to ·3 in. puberulous. *Flowers* ·35 to ·5 in. in diam., in lax axillary racemes or cymes, the pedicels puberulous, slender, longer than the flowers; buds sub-globose or obovate. *Calyx* irregularly lobed, glabrous, the edges scarious. *Petals* oblong, obtuse, ·3 to ·4 in. long. *Stamens* 8, or fewer; the filaments broad and united into a tube, their apices free and filiform, the anthers ovate. *Ovary* sessile, on a small annular disc. *Berries* ovoid at first, globose when ripe, ·6 to ·8 in. in diam. Hook. fil. Fl. Br. Ind. I, 511: Miq. Fl. Ind. Bat. I, Pt. 2, p. 519; Kurz For. Flora Burmah I, 195: DC. Prod. I, 535; W. and A. Prodr. 91; Wight Ill. I, 108; Wall. Cat. 6353; Oliv. in Journ. Linn. Soc. v. Suppl. II, 24: Dalz. and Gibs. Bomb. Flor. 28. *A. floribunda*, Wight, Ic. t. 1611. *A. platistigma*, Wight Ill. I, 108. *Limonia monophylla*, Linn.; Roxb Cor. Pl. I, t. 82; Fl. Ind. II, 378. *Turræa virens*, Hellen. in Act. Holm. 1788, t. 10, f. I, (not of Linn.). *Trichilia spinosa*, Willd.; DC. Prodr. I, 623. Rheede Hort. Mal. IV, t. 12; Burm. Fl. Zeyl. t. 65, f. I.

Penang, Kedah, Andaman and Nicobar Islands. DISTRIB.—British India, in Sylhet, and in the Peninsula, Ceylon.

The plant named *A. macrophylla* by Kurz (For. Fl. Burmah I, 195), of which there are excellent specimens in the Calcutta Herbarium, seems to be only a luxuriant form of this. I can find no characters in which it differs, except size.

2. ATLANTIA ROXBURGHIANA, Hook. fil. (not of Oliver), Fl. Br. Ind. I, 513. A glabrous shrub or small tree: young branches slender, spineless. *Leaves* thinly coriaceous, elliptic or elliptic-oblong, tapering to each end, the apex sub-acute or shortly acuminate; the base cuneate, rarely rounded; main nerves 10 to 14 pairs, spreading, slightly prominent underneath when dry; length 4 to 6 in., breadth 1·75 to 2·25 in., petiole ·3 in. *Racemes* short, few-flowered, axillary. *Flowers* nearly ·5

in. in diam., buds globose. *Calyx* with 4 obtuse lobes. *Petals* 4, obovate. *Stamens* 8; the anthers oblong-ovoid; filaments free, short, subulate. *Ovary* ovoid, sessile, 2-celled. *Berry* globose when ripe, glabrous, ·6 to ·8 in. in diam. Hook. fil. Fl. Br. Ind. I, 513. *Sclerostylis Roxburghii*, Wight, Ic. t. 72. *Amyris simplicifolia*, Roxb. Fl. Ind, II, 244.

Perak: common. Penang, Malacca; Griffith (Kew Distrib.) No. 537.

There are in the Calcutta Herbarium a large number of fruiting specimens of this from Perak; but not a single one in flower. These specimens agree so entirely with Roxburgh's figure of *Amyris simplicifolia* in the Calcutta Herbarium (of which Wight's Ic. 72 is a copy) and with Griffith's Malacca specimen (No 537), that I have no hesitation in referring them to the same species. The description of the flowers given above is copied from Sir Joseph Hooker's Fl. Br. Ind. I, 513.

ORDER XXIV. SIMARUBEÆ.

Trees or shrubs, usually with bitter bark. *Leaves* alternate, often large, pinnate or rarely simple; stipules 0 or deciduous. *Inflorescence* axillary, racemose, paniculate or cymose, rarely spicate. *Flowers* usually diclinous, regular, and generally small. *Calyx* 3–5-lobed, valvate or imbricate. *Petals* 3–5, very rarely 0, hypogynous, valvate or imbricate. *Disc* annular or elongate, simple or lobed, rarely 0. *Stamens* as many or twice as many as the petals, rarely indefinite, inserted at the base of the disc; filaments free, often with a scale at the base; anthers oblong, usually introrse, 2-celled, dehiscing longitudinally. *Ovary* free, 1–6-celled, usually deeply lobed, less often entire; styles 2–5, free, or more or less united, stigmas capitate; ovules usually solitary in each cell, rarely more numerous, raphé ventral, micropyle superior. *Fruit* drupaceous, capsular, or occasionally samaroid, usually of 2–6 distinct carpels. *Seeds* usually solitary, erect or pendulous, albuminous; embryo straight or curved, radicle superior.—DISTRIB. Tropical and subtropical regions of both hemispheres; genera 30; species about 130.

Ovary deeply 4- or 5- lobed; fruit separating into cocci; leaves pinnate.
- Stamens 8 to 10, filaments with dilated ciliate bases ... ... 1. *Harrisonia.*
- Stamens 4.
  - Disc entire: flowers in branching panicles; leaves glabrous ... 2. *Picrasma.*
  - Disc 4-lobed; flowers in small cymes, collected in long narrow panicles; leaves pubescent ... ... 3. *Brucea.*

Stamens 5; disc 5-lobed; flowers in long much-branched panicles; leaves glabrous ... ... 4. *Eurycoma.*
Ovary not lobed; fruit not separating into cocci; leaves simple ... ... 5. *Irvingia.*

1. HARRISONIA, Brown.

Glabrous spiny shrubs. *Leaves* unequally pinnate or 1-foliolate. *Flowers* hermaphrodite, in bracteate cymes. *Calyx* small, 4–5-fid. *Petals* 4–5, longer than calyx. *Disc* hemispherical. *Stamens* 8–10, dilated at the base. *Ovary* globose or 4–5-lobed, 4–5-celled; styles connate or distinct at the base; ovules solitary, pendulous. *Fruit* a small globose berry. *Seed* solitary, sparingly albuminous.—DISTRIB. Tropics of Old World and of Australia. Species 3-4.

1. **HARRISONIA BROWNII**, A. Juss. in Mem. Mus. Par. XII, 517, 540, t. 28. A shrub; young branches slender, glabrous, lenticellate, often armed with sharp conical prickles usually in pairs. *Leaflets* 3, ovate to rhomboid, acuminate, coarsely serrate; the terminal one the largest, petiolulate, and much narrowed at the base; the two lateral sessile and slightly narrowed; length from ·6 to 1 in. *Flowers* 1 to 3, when expanded ·3 in. long, tetramerous, from small axillary tubercles on slender pedicels from ·5 to ·75 in. long, buds globose. *Petals* lanceolate, reflexed. *Stamens* 8, erect, as long as the petals; filaments with dilated concave hairy bases, anthers ovate. *Ovary* deeply 4-lobed, 4-celled, glabrous. *Fruit* pisiform, depressed, 3–2- or even 1-celled by abortion, each cell one-seeded; pericarp coriaceous, glabrous. Planch. in Hook. Lond. Journ. Bot. V. 569; Benth. Fl. Austral. I, 376.

S. Andaman: Kurz, King's collectors. DISTRIB.—Timor., N. Australia. Philippines.

2. PICRASMA, Blume.

Trees or shrubs with bitter properties. *Leaves* unequally pinnate. *Flowers* small, declinous or polygamous, in axillary panicles. *Calyx* very small, 4–5 toothed. *Petals* 4–5, valvate, very often increasing after flowering. *Disc* thick, entire. *Stamens* 4–5, not scaly, hairy. *Ovary* 3–5-partite, free; style distinct at the base and apex, but united in the middle, stigmas simple; ovules erect, solitary. *Fruit* of 1–3 fleshy or coriaceous drupes. *Seed* erect, albuminous.—DISTRIB. India, Malay Archipelago, China, Japan, West Indies, Brazil. Species about 4.

1. **PICRASMA JAVANICA**, Blume, Bijdr, 248. A tree 30 to 60 feet high; young branches glabrous, dark-coloured, rather slender. *Leaflets* 3 to 7, membranous, elliptic-oblong, elliptic-lanceolate or elliptic, more or less

acuminate or caudate-acuminate, the edges entire or (especially in old leaves) thickened and minutely undulate, the base narrowed or rounded; both surfaces glabrous; main nerves 4 to 6 pairs, ascending, curved, rather prominent and pale beneath in adult leaves. *Panicles* axillary, on long peduncles, branching. *Flowers* numerous, crowded at the extremities of the branchlets, 4-merous, ·15 to ·25 in. in diam. *Sepals* broadly ovate, spreading, pubescent, minute. *Petals* much larger than the sepals, ovate, concave, nerved, puberulous. *Stamens* 4; the filaments pubescent in the male, villous in the female flower. *Ovary* deeply 4-lobed, puberulous; the disc entire, woolly. *Style* single; stigmas 4, reflexed. *Fruit* of 1 to 3 sub-globular coriaceous drupes seated on the enlarged disc, and surrounded by the enlarged coriaceous curved petals. Benn. Plantae Javan. Rarior. 197. t. 41; Planch. in Hook. Lond. Journ. Bot. V, 573; Hook. fil. Fl. Br. Ind. I, 520; Kurz for Flor. Burma, I. 201. *P. nepalensis*, Benn. in Wall. Cat. sub No. 8506. (Lith. Cat. p. 287); Pl. Jav. Rar. 201; Planch. in Hook. Journ. Bot. V, 573. *P. andamanica*, Kurz Andam. Rep. App. IV; Hook. fil. Fl. Br. Ind. I, 520; *Brucea?* Wall. Cat. 7499. *B. dubia*, Steud. Nomencl. Wall. Cat. *indeterminata*, No. 9037.

Malacca, Perak, Andamans. DISTRIB.—Malayan Archipelago, sub-Himalayan tracts, Assam, Khasia Hills and Burmah, in British India.

I can find nothing to distinguish *P. nepalensis* Benn. and *P. andamanica*, Kurz from *P. javanica*, Blume. In fact Kurz himself reduced his species *P. andamanica* to *P. javanica;* and in his latest book (The Flora of British Burmah), he does not give the name *P. andamanica*, which was in fact originally published in a hastily prepared official report. And, as for *P. nepalensis*, Benn.—its author declares in his original description of it, that it differs from *P. javanica*, Bl., only by having sometimes as many as seven leaflets, and in their being more acuminate than is usual in specimens from Java.

3. BRUCEA, Mill.

Bitter trees or shrubs. *Leaves* large, unequally pinnate. *Flowers* in minute, numerous, very small cymes, collected into long narrow axillary panicles. *Calyx* minute, 4-partite, imbricate. *Petals* 4, minute, linear, imbricate. *Disc* 4-lobed. *Stamens* 4, inserted beneath the disc, filaments naked. *Ovary* 4-lobed, or consisting of 4 entirely free carpels. *Drupes* 4, entirely free, ovoid, somewhat fleshy. *Seed* solitary, exalbuminous.—DISTRIB. Tropics of Old World and of Australia. Species 6.

1. BRUCEA SUMATRANA, Roxb. Fl. Ind. I., 449. A shrub 4 to 6 feet high; young branches rather stout, tawny-pubescent. *Leaflets* about

9, membranous, lanceolate, acuminate, very coarsely dentate-serrate; the base oblique, acute, or obtuse; both surfaces, but especially the lower, softly yellowish-pubescent, 1·5 to 3·5 in. long (the whole leaf from 10 to 14 in. long), petiolule ·15 to ·25 in. long. *Panicles* often as long as the leaves, very narrow. *Flowers* minute, purple, in short distant cymules; the sepals smaller than the petals, both pubescent. *Stamens* about as long as the petals, the filaments short. *Drupes* black when ripe, oval, glabrous, ·15 to ·2 in. long. DC. Prod. II, 88; Wall Cat. 8482; Blume Bijdr., 1167; Planch. in Hook. Lond. Journ. Bot. v., 575; Hook. fil. Fl. Br. Ind. I, 523; Kurz For. Flora, Burma, I, 202.

In all the provinces except the Andaman and Nicobar Islands.—Distrib. Malayan Archipelago, British India.

4. Eurycoma, Jack.

Shrubs or small trees, with bitter bark. *Leaves* very large, unequally pinnate, with entire glabrous leaflets. *Flowers* polygamous, in much-branched sub-terminal glandular-hairy panicles. *Calyx* minute, 5-toothed, valvate. *Petals* 5, induplicate-valvate. *Disc* consisting of 5 glands alternating with the stamens. *Stamens* in male and hermaphrodite flowers 5, smaller in the latter; filaments attached to the base of the petals. *Ovary* 5-partite, free; styles 5, connate, stigmas distinct. *Drupes* 3–5, stipitate. *Seed* solitary, pendulous, exalbuminous.—Distrib. Malaya, Philippines. Species 2.

Branches 1 in. thick, rusty-pubescent; petals ·25 in. long, thick, pubescent on both surfaces	1. *E. longifolia.*
Branches ·25 in. thick, glabrous, pale; petals ·35 in. long, thin, glabrous inside ...	2. *E. apiculata.*

1. Eurycoma longifolia, Jack Roxb. Fl. Ind. ed. Carey, II, 307. A shrub or small tree; young branches about 1 in. in diam., densely rusty-tomentose, with large cicatrices. *Leaves* 18 to 24 in. long; the leaflets numerous, coriaceous, oblong-lanceolate, acute, entire; the base oblique, cuneate; both surfaces glabrous, the upper shining; length 3 to 4 in., breadth ·75 to 1 in. *Panicles* usually shorter than the leaves, much-branched, many-flowered, clothed (especially in the younger parts) with rufous glandular hairs. *Calyx* much shorter than the corolla, the segments ovate, spreading. *Petals* thick, erect, ovate-lanceolate, purple, pubescent, slightly glandular in the upper half outside, ·25 in. long. *Stamens* longer than the calyx, alternating with 5 rather large bilobed ciliate glands which are large in the male and small in the hermaphrodite. *Fruit* of 1 to 5, stipitate, narrowly ovoid, apiculate, ridged drupes, ·5 in. long and ·25 in. diam.; the pericarp coriaceous, purple, glabrous. DC. Prodr. ii. 86; Wall. Cat. 8522; Planch. in Hook. Lond. Journ.

Bot. v. 584. *E. merguensis*, Planch. l. c.; *E. tavoyana*, Wall. Cat., 8523; Hook. fil. Fl. Br. Ind. I, 521; Kurz For Flora Burmah. I, 202.

In all the provinces except the Andaman and Nicobar islands. DISTRIB.—Malayan Archipelago, Philippines, Burmah.

2. EURYCOMA APICULATA, A. W. Bennett in Hook. fil. Fl. Br. Ind. I, 522. A shrub or small tree; young branches about ·25 in. thick, nearly glabrous, rather pale. *Leaves* 12 to 15 in. long; the leaflets numerous, sub-coriaceous, oblong-lanceolate, shortly and rather abruptly acuminate; the base acute, very slightly oblique; both surfaces glabrous, dull; length 2·5 to 5·5 in., breadth 1 to 1·7 in. *Panicles* shorter than the leaves; the lateral branches short, slender, few-flowered, clothed, especially towards the extremities, with short, black glandular hairs. *Calyx* much shorter than the corolla, the segments sub-erect, ovate, acute. *Petals* thin, erect, linear, glabrous inside, glandular outside, ·35 in. long. *Stamens* about as long as the sepals, alternating with very minute entire glands. *Fruit* as in *E. longifolia.*

Penang: Perak, not so common as the last.

This species comes very near *E. longifolia*, Jack., the chief distinction being in the flowers. The branches are also very much thinner than those of *E. longifolia*, and they are glabrous; the panicles have shorter and fewer-flowered branches.

5. IRVINGIA, Hook. f.

Glabrous insipid trees. *Leaves* simple, coriaceous, entire, with deciduous stipules. *Flowers* hermaphrodite, in axillary panicles, ebracteate. *Calyx* small, 4–5-partite, imbricate. *Petals* 4–5, imbricate. *Disc* very large, cushion-shaped. *Stamens* 10, inserted beneath the disc, filaments long, slender. *Ovary* conical, compressed, 2-celled, entire; style simple, terminal; ovules solitary. *Fruit* drupaceous, large, with 1 pendulous exalbuminous seed. Four species—3 Tropical African, and 1 Malayan.

1. IRVINGIA MALAYANA, Oliver ex Hook. fil. Fl. Br. Ind. I, 522. Young branches glabrous, striate. *Leaves* coriaceous, glabrous, elliptic, acute, entire, the base rounded; main nerves 14 to 16 pairs, spreading, curved, inconspicuous: length 3·5 to 5·5 in., breadth 1·75 to 2·4 in., petiole ·6 to ·7 in. *Panicles* axillary, little-branched, shorter than the leaves. *Flowers* small, hermaphrodite. *Calyx-lobes* ovate, obtuse. *Petals* twice as long as the calyx and equal to the stamens, reflexed after flowering. *Disc* large, bearing the conical ovary in the middle of it. *Fruit* a glabrous compressed drupe, 2 in. long and nearly 1·5 in. in diam.

Malacca; Maingay (Kew Distrib.) No. 468.

ORDER XXV. OCHNACEÆ.

Glabrous trees or shrubs. *Leaves* alternate, simple, (very rarely pinnate) coriaceous; stipules 2. *Inflorescence* panicled or occasionally umbellate (rarely flowers solitary), bracteate. *Flowers* hermaphrodite, conspicuous. *Sepals* 4–5, free, imbricate, persistent. *Petals* 5, rarely 4 or 10, free, hypogynous, imbricate, longer than the sepals, deciduous. *Disc* enlarged after flowering, occasionally 0. *Stamens* 4, 5, 8, 10, or indefinite, inserted on the disc, filaments persistent; anthers basifixed, sometimes deciduous, dehiscing longitudinally, or often opening by terminal pores. *Ovary* short, 2-celled, or elongate and 1–10-celled; placenta axile or parietal; style simple, subulate, acute, rarely divided at the extremity, stigmas simple, terminal; ovules 1–2 in each cell, or indefinite, ascending or rarely pendulous, raphe ventral, micropyle superior. *Fruit* indehiscent, drupaceous or baccate, compound; each drupe or pyrene 1–4 seeded; or capsular and 1–5-celled with septicidal dehiscence. *Seeds* solitary, few or numerous; albumen fleshy or 0; embryo straight or rarely curved, radicle superior or inferior.—DISTRIB. Tropical regions of both hemispheres, but chiefly American. Species about 160.

TRIBE 1. OCHNEÆ. *Ovary* 2–10-celled; ovules solitary in each cell. *Seeds* exalbuminous.

Stamens ∞; flowers paniculate ... ... 1. *Ochna.*
Stamens 10; flowers paniculate or umbellate 2. *Gomphia.*
Sepals, petals, and stamens 4 ... ... 3. *Tetramerista.*

TRIBE 2. EUTHEMIDEÆ. *Ovary* imperfectly 5-celled; ovules 2 in each cell. *Seeds* albuminous.

Stamens 5; with alternate staminodes ... 4. *Euthemis.*

1. OCHNA, Linn.

Glabrous trees or shrubs. *Leaves* alternate, simple, serrate, rarely entire, 2-stipulate. *Flowers* large, yellow, in bracteate panicles or umbels. *Sepals* 5, coloured, persistent. *Petals* 5–10, deciduous. *Disc* thick, lobed. *Stamens* ∞, shorter than the petals, filaments short or elongated; anthers opening longitudinally, deciduous. *Ovary* deeply 3–10-lobed, lobes 1-celled; styles entirely connate or distinct at the apex; ovules solitary in each cell, axile. *Fruit* 3–10 drupes, seated on the broad disc. *Seed* erect, albuminous.—DISTRIB. Tropical Asia and Africa. Species about 28.

1. OCHNA WALLICHII, Planch. in Hook. Lond. Journ. Bot. V, 650. A small tree, with elliptic or elliptic-oblong, sub-crenate, sub-serrate or entire, acute leaves, with cuneate or sub-rounded bases; the main nerves sub-horizontal, faint; length 3 to 5·5 in.; breadth 1·5 to 2·5 in.;

petiole ·15 to ·2 in. *Stipules* very minute. *Flowers* 1·5 in. in diam., in short lateral panicles, the pedicels 1 in. or more in length. *Sepals* ovate or lanceolate, usually reflexed in fruit. *Petals* larger than the sepals. *Anthers* linear, deciduous, shorter than the filiform persistent filaments. *Styles* longer than the stamens, cuneate to the apex, or the apices free and spreading. *Drupes* ovoid, about ·5 in. long. Hook. fil. Fl. Br. Ind. (excl. syn. *O. stipulacea*, Colebr. MSS.). *O. nitida*, Wall. Cat. 2894 (not of Thunbg.); Planch. in Hook. Journ. Bot. V, 653; Kurz For. Fl. Burm. I, 205. *O. squarrosa*, Kurz Andaman Report IV (not of Linn.). *O. andamanica*, Kurz Andam. Rep. Ed. II, 33; Journ. As. Soc. Bengal, for 1872, pt. 2, 295; For. Flora Burm. I, 205. *O. obtusata*, DC. Wall. Cat. 2805, B.

Andaman Islands.—Distrib. Burmah.

Kurz distinguished his species *O. andamanica* by the styles being free and spreading at their apices, while the fruiting sepals are reflexed. But I do not find that these two characters are at all constantly associated. In other respects, Kurz's characters of *O. Wallichii*, and *O. andamanica* are identical. *O. stipulacea*, Colebr., reduced to this by Mr. A. W. Bennett, in Fl. Br. Ind., appears to me to be distinct.

2. Gomphia, Schreb.

Glabrous trees or shrubs. *Leaves* alternate, shining, 2-stipulate. *Flowers* yellow, in axillary or terminal racemes or umbels. *Sepals* 5, coloured, persistent. *Petals* 5, imbricate. *Disc* thick, lobed. *Stamens* 10, inserted at the base of the disc, filaments very short, anthers opening by terminal pores. *Ovary* deeply 5–6-lobed, lobes 1-celled; styles connate, stigma simple; ovules solitary in each cell, erect. *Drupes* 5 or fewer, seated on a broad disc, 1-seeded. *Seed* erect, exalbuminous.—Distrib. Chiefly tropical South American: a few in Asia and Africa. Species about 80.

Flowers in diffuse panicles ... ... 1. *G. sumatrana.*
Flowers in corymbs ... ... 2. *G. Hookeri.*

1. Gomphia sumatrana, Jack in Mal. Misc. No. 5, p. 29; Hook. Bot. Misc. II., 77. A tree 22 to 40 feet high; young branches slender, pale. *Leaves* coriaceous, narrowly elliptic-oblong, tapering to each end, the edges serrulate or sub-entire; main nerves numerous, sub-horizontal, very faint, as are the reticulations; intramarginal nerves from base to apex, two or three, rather distinct when dry; length 3·5 to 7 in., breadth 1·15 to 2·25 in., petiole ·15 in. *Panicles* terminal, longer than the leaves, branching. *Flowers* numerous, ·35 in. in diam. *Sepals* narrowly ovate, veined. *Petals* larger than the sepals, broad, retuse and inflexed at the apex. *Anthers* linear, much longer than

the short filaments. *Ovaries* 5; styles longer than the stamens, quite connate. *Ripe carpels* obovate or reniform, shining. Hook. fil. Fl. Br. Ind. I, 525; Kurz For. Flora Burm. I, 206; Miq. Fl. Ind. Bat. I, pt. 2, 675; Wall. Cat. 2803. *G. sumatrensis*, Planch. in Hook. Ic. Pl. t. 712, and Hook. Lond. Journ. Bot. VI. 2. *Ochna crocea*, Griff. Not. IV. 463. *E ? pulcherrima*, Wall, Cat. 2518.

In all the provinces except the Nicobar and Andaman Islands: common.—DISTRIB. Borneo, Sumatra.

This is very near indeed to G. *angustifolia*, Vahl.; the only differences that I can find between the two being that in this the petals are larger, with more reflexed edges, and the panicles are larger and more diffuse.

2. GOMPHIA HOOKERI, Planch. in Hook. Lond. Journ. Bot. VI, 3. A tree; young branches dark-coloured. *Leaves* coriaceous, ovate-oblong to oblong-lanceolate, the base narrowed; main nerves faint, much curved upwards, no continuous intramarginal nerve; upper surface shining, the lower dull; length 2·5 to 6 in., breadth 1 to 2 in., petiole 1·5 to ·35 in. *Flowers* ·35 in. in diam., in lateral or terminal, crowded, minutely bracteolate umbels; the pedicels slender, ·5 to ·7 in. long. *Sepals* lanceolate. *Petals* very deciduous, about as long as the sepals, oblong, obtuse, not narrowed at the base. *Anthers* deciduous, elongate, about as long as the slender persistent filaments. *Ovaries* 5; styles much longer than the stamens, quite connate. *Ripe carpels* sub-globular or obovoid, smooth, ·2 in. diam. Hook. fil. Fl. Br. Ind. I, 525.

In all the provinces except the Nicobar and Andaman Islands.

In the flowers of different individuals, the disc varies in thickness, being in some as thick as the ovaries are long, while in others it is comparatively shallow.

VAR. *corymbosa;* flowers in corymbs, which are sometimes compound; the lengthened rachis of the inflorescence rough from the transverse cicatrices of the fallen bracts; shrubby.

3. TETRAMERISTA, Miq.

Shrubs or trees. *Leaves* very large, coriaceous, entire. *Flowers* in axillary racemes with large foliaceous bracts. *Sepals* 4, imbricate, persistent. *Petals* 4, persistent. *Stamens* 4, the filaments with dilated bases, the anthers with sutural dehiscence. *Ovary* 4-angled, 4-celled, the style entire. *Fruit* baccate, globose; the pericarp leathery.—DISTRIB. Malaya. Species 1 or 2.

1. TETRAMERISTA GLABRA, Miq., Fl. Ind. Bat. Suppl., 534. A glabrous tree 30 to 50 feet high; young branches stout, with shining, rather pale bark. *Leaves* narrowly obovate or oblanceolate, sub-sessile,

the apex obtuse; the base much narrowed, minutely sagittate; upper surface shining, the lower dull, chocolate-coloured when dry; main nerves numerous, sub-horizontal; length 5 to 10 in., breadth 1·25 to 2·75 in., petiole under ·1 in. *Flowers* 1 in. in diam., in long-pedunculate axillary umbellate racemes; pedicels about ·5 in. long, each with a sepal-like bract near the flower. *Sepals* coriaceous, oblong, obtuse. *Petals* linear-lanceolate, about as long as the sepals and reflexed like them. *Stamens* elongate, shorter than the reflexed filaments. *Ovary* ovoid, obscurely 4-angled. *Style* single, stigma minute. *Ripe fruit* ovoid-globose, 1·25 to 1·5 in. long, sub-glabrous, the calyx and corolla persistent; the pericarp thick, fleshy. Bennett in Hook. fil. Fl. Br. Ind. I, 526. *Ancistrocladus ? sagittatus*, Wall. Cat. 1055.

Singapore; Wallich. Perak: Wray, Scortechini, King's collector. DISTRIB. Sumatra.

4. EUTHEMIS, Jack.

Glabrous shrubs. *Leaves* alternate, simple, shining, coriaceous, serrulate, with ciliate deciduous stipules. *Flowers* rose or white, in terminal or leaf-opposed racemes or panicles, bracteate. *Sepals* 5, imbricate, persistent or deciduous. *Petals* 5, longer than sepals, imbricate. *Disc* small, conical. *Stamens* 5, inserted at the base of the disc, with alternate staminodes, anthers opening by terminal pores. *Ovary* semi-5-celled, elongate, viscid; style 1, stigma entire; ovules 1–2 in each cell, pendulous. *Fruit* a berry of 5 pyrenes, each 1–2-seeded. *Seeds* pendulous with a fleshy albumen.—DISTRIB. Species 4; all Malayan.

Leaves spinulose-serrate; fruit white ... 1. *E. leucocarpa.*
Leaves nearly entire; fruit red ... ... 2. *E. minor.*

1. EUTHEMIS LEUCOCARPA, Jack in Mal. Misc. No. V., p. 16. A shrub 2 to 5 feet high: young branches rather stout, pale, glabrous, lenticellate. *Leaves* oblong-lanceolate, tapering to each end, the edge thickened inside the numerous spinulose serrations; main nerves very numerous, curved at first, then sub-horizontal, indistinct; length 3·5 to 8 in., breadth 1·2 to 2 in.; petiole ·5 to 1·5 in., winged. *Flowers* ·6 or ·7 in. in diam, shortly pedicelled, generally in pairs; bracts ovate, acute. *Sepals* ovate, obtuse, ciliate, the two inner rather smaller. *Petals* longer than the sepals, oblong-ovate, obtuse, reflexed. *Anthers* erect, connivent, subsessile, oblong, acuminate at the apex, style filiform; stigma small, simple. *Berry* snow-white, sub-globular, ·2 to ·35 in. in diam., obscurely angled, mesocarp spongy. Roxb. Fl. Ind. (ed. Carey), II, 303; Planchon in Hook. Ic. Plant. t. 711. Bennett in Hook. fil. Fl. Br. Ind. I, 526; Miq. Fl. Ind. Bat. Pt. 2 p. 675.

In all the provinces except the Andaman and Nicobar islands. DISTRIB. Malayan Archipelago.

2. EUTHEMIS MINOR, Jack in Mal. Misc. No. V, p. 18. A small shrub, similar to the last, but with nearly entire, sub-acute, obscurely-veined leaves, and red fruits. Roxb. Fl. Ind. (ed. Carey), ii, 304; Bennett in Hook. fil. Fl. Br. Ind. I, 526; Miq. Fl. Ind. Bat. I, Pt. 2, p. 675.

Penang and Singapore.—DISTRIB. Malayan Archipelago.

I give Penang and Singapore as localities for this species, on the authority of Hooker's Flora of British India. It is, however, now probably extinct in both; and I have seen no specimens from any locality nearer to them than the island of Bangka. In Jack's time, this plant appears to have been common enough in Singapore. The plant named *Euthemis elegantissima*, by Wallich, although doubtfully placed in this genus by its author, has leaves very like those of *E. leucocarpa;* but the main nerves curve in a very different manner. Wallich never found it in fruit; but in his day plants of it were common in Singapore and the neighbouring small islands. This too appears now to be extinct. The reduction of *E. elegantissima* to *Gomphia sumatrana*, Planch, which was first suggested by Planchon, is in my opinion quite wrong, the leaves of the two being very different.

ORDER XXVI. BURSERACEÆ.

Trees or shrubs, mostly resiniferous. *Leaves* alternate (very rarely opposite), imparipinnate or trifoliolate, stipulate or ex-stipulate. *Inflorescence* racemose or paniculate. *Flowers* regular, small, hermaphrodite or often polygamous. *Calyx* free, 3–6-lobed, imbricate or valvate, often minute. *Petals* 3–6, distinct, rarely connate, imbricate or valvate. *Disc* annular or cupular, or absent, usually conspicuous, free, or adnate to the calyx. *Stamens* as many or twice as many as petals, inserted at the base or margin of the disc, equal or unequal; filaments free or connate at the base, smooth; anthers dorsifixed, rarely innate, 2-locular, dehiscing longitudinally. *Ovary* free, rarely 1-, more often 2–5-celled; style simple, stigma undivided or 2–5-lobed; ovules 2, or rarely 1 in each cell, anatropous, usually pendulous, rarely ascending, micropyle superior, raphe ventral. *Fruit* drupaceous, indehiscent with hard putamen, or separating into 2–5 pyrenes, rarely pseudo-capsular and dehiscent. *Seeds* solitary, usually pendulous, testa membranous, albumen 0; cotyledons usually membranous, contortuplicate, rarely fleshy and plano-convex, radicle superior.—DISTRIB. Tropical regions of both hemispheres; genera 15 to 19. Species about 250.

Calyx, corolla, and stamens 5-merous.
  Fruit hard, woody, 3-winged, separating
    into 3 indehiscent pyrenes ... 1. *Triomma.*

Flowers 3-merous.
  Flowers polygamous, dimorphorus. Fruit ellipsoid, more or less trigonous, with terminal style; endocarp bony, 1-3-celled, usually 1-seeded ... ... 2. *Canarium.*
  Fruit obliquely globose, 1-celled, 1-seeded. Calyx keeled, the segments large, connivent ... ... 3. *Trigonochlamys.*
  Flowers hermaphrodite, homomorphous. Fruit ellipsoid or sub-globose, with the stigmatic scar lateral or basal, more or less compressed on two sides, rounded on the third; endocarp rarely bony or woody, 1-celled, 1-seeded ... ... 4 *Santiria.*

1. TRIOMMA, Hook. fil.

A tree. *Leaves* alternate, exstipulate, imparipinnate; the leaflets few, opposite, petiolulate. *Flowers* very small, in terminal panicles, polygamous. *Calyx* 5-fid. *Petals* 5, small, valvate? *Stamens* 10 (?) inserted at the base of the 5-lobed disc. *Ovary* trigonous, 3-celled, style short, ovules 2 in each cell. *Fruit* 3-winged, 3-valved, as much as 2–2½ inches long, containing 3 hard woody separable pyrenes.—DISTRIB. A solitary species.

1. TRIOMMA MALACCENSIS, Hook. f. in Trans. Linn. Soc. XXIII. 171; leaflets oblique, ovate-lanceolate, acuminate, entire; drupe ovate-caudate, acutely cuspidate, 2·5 in. long by 2 in. broad: Bennett in Hook. fil. Fl. Br Ind. I, 528. *Arytera? macrocarpa*, Miq. Fl. Ind. Bat. Suppl. 199.

Malacca: Griffith, Maingay.

There is an authentic specimen in the Calcutta Herbarium of Miquel's *Arytera? macrocarpa*, collected by Teysmann in the Lampongs, Eastern Sumatra. There is no doubt whatever of its identity with this.

2. CANARIUM, Linn.

Reziniferous trees. *Leaves* alternate, imparipinnate, stipulate or exstipulate. *Flowers* bracteate, in terminal or axillary panicles or racemes, dimorphous, polygamous; those with fertile stamens and rudimentary ovaries being smaller, but in larger inflorescences; those with fertile ovary having rudimentary stamens, being larger, but in smaller inflorescences. *Calyx* campanulate, 3-lobed or 3-fid, valvate. *Petals* 3, imbricate below or valvate, usually exceeding the calyx. *Stamens* 6, distinct, inserted on margin or outside of disc, or filaments confluent below and disc absent. *Ovary* 3-celled; ovules 2 in each cell; style various, or stigma subsessile, capitate. *Drupe* usually ellipsoidal, more or less distinctly trigonous, with a 1–3-celled, 1–3-seeded stone; cotyledons often partite, contortuplicate. DISTRIB. Tropical Asia, chiefly in Malaya. Species probably about 90.

The genera *Santiria* and *Canarium* are not separated from each other by any bold, well-marked distinction. As regards the Indian species of both genera, I find the following characters the most diagnostic :—

CANARIUM.	SANTIRIA.
Calyx cupular or campanulate.	*Calyx* cupular, never campanulate, sometimes quite flat.
Petals longer than broad, slightly narrowed to the base.	*Petals* rotund, with very broad truncate bases.
Disc small, annular, or thin and cupular, or represented only by the tube formed by the united filaments.	*Disc* large, cupular, fleshy, often corrugated.
Filaments dilated at the base and sometimes united into a tube.	*Filaments* dilated at the base, but never united into a tube.
The flowers with fertile anthers (practically the male flowers) smaller than those with fertile ovaries, but in larger inflorescences.	*Flowers* all hermaphrodite and uniform, as are the inflorescences.

In the majority of the species of *Canarium* in which the filaments are united into a tube, I can find no other disc than that tube.

The genus *Trigonochlamys* is also closely allied to *Canarium* and *Santiria*, being distinguished from both by its much larger calyx, depressed-globose ovary, and spherical drupe. In fact the characters of the three genera so overlap each other, that, in my opinion, they must either be kept distinct by characters more or less minute, as Messrs. Bentham and Hooker have done, or united into a single genus. Dr. Engler steers a middle course; he keeps up *Canarium* and *Santiria*, but unites *Trigonochlamys* with the latter, dividing *Santiria* into three sections: (1) *Icicopsis*, with one species (*S. Planchoni*); (2) *Trigonochlamys*, with four species; and (3) *Eu-santiria* with 22 species. The section *Icicopsis* contains one 3-androus plant, which, as it has the dimorphous flowers and inflorescence of *Canarium*, I have transferred to that genus. I admit that the drupes of the plant in question more resemble those of *Santiria* than of *Canarium*: but, in the majority of its characters, it appears to me to agree better with the latter genus. As regards Dr. Engler's section *Trigonochlamys*, it is difficult to see how *Canarium* and *Santiria* are to be kept distinct as genera, if the four plants which form this section are to be included under *Santiria*; for the flowers of *Trigonochlamys* are really more like those of *Canarium* than of *Santiria*. The separation of *Canarium* from *Santiria* by characters taken from the drupe, in my opinion, fails. The drupe of *Canarium* is defined as 1 inch or more in length, ovoid or oblong-ovoid, never gibbous, boldly trigonous, its sides equal and its endocarp hard thick and strong, 3-to 1-celled, and the scar of the style apical; while that of *Santiria* is usually less than 1 in. long, shortly and obliquely ovoid or sub-globose, often gibbous, the endocarp being thin, coriaceous, sub-ligneous, never bony, 1-celled, and the scar of the style lateral and often approximated to the base. Unfortunately several species from Perak (which in other respects have the *facies* of *Santiria*) have the style-scar quite terminal; while, on the other hand, some species with many of the characters of *Canarium* have drupes of which the endocarp is not more bony than that of several species of *Santiria*. The characters drawn from the flower, which I have given above, do not appear to me to have hitherto had sufficient value attached to them.

By transferring *Santiria Planchoni*, Benn. to *Canarium;* by keeping up *Trigonochlamys* as a genus characterised by its very large calyx, and globose drupe; and by restricting *Santiria* to the plants which form the section *Eu-santiria* of Engler, I venture to think that the study of all the plants concerned will be simplified.

Stamens 3.
Leaves sub-coriaceous with bluntly acuminate apices and 10 to 14 pairs of main nerves, flowers ·1 in. long, drupes ·4 to ·5 in. long ... ... 1. *C. Planchoni.*
Leaves coriaceous, with caudate-acuminate apices and 7 to 9 pairs of main nerves; flowers ·2 in. long; drupes 2 to 2·25 in. long ... ... 2. *C. caudatum.*
Stamens 6.
Filaments united into a tube.
Leaflets glabrous on both surfaces.
Leaflets 5 to 9 with 7 or 8 pairs of nerves; panicles terminal ... 3. *C. parvifolium.*
Leaflets 11 to 17, with 12 to 19 pairs of nerves; panicles axillary ... 4. *C. euphyllum.*
Leaflets more or less hairy.
Leaflets 7 to 9, sparsely pubescent on the lower surface when young, main nerves 10 or 12 pairs; panicles axillary ... ... 5. *C. grandiflorum.*

- Leaflets sparsely hispid on both surfaces when young; glabrous, except the hispidulous nerves, when adult; panicles hispidulous ... ... 6. *C. pilosum.*
- Leaflets sparsely hispidulous on the upper surface, their under surface and the inflorescence rufous-pubescent or tomentose ... ... 7. *C. hirtellum.*
- Leaflets with the midrib tomentose on the upper surface, the whole of the under surface and the panicles rufous-tomentose ... ... 8. *C. rufum.*
- Leaflets glabrous on the upper surface, the lower glaucescent, with a few scattered hairs; panicles rusty-tomentose ... ... 9. *C. purpurascens.*

Filaments free.

- Leaflets quite glabrous on both surfaces; petals puberulous outside.
    - Stipules persistent.
        - Stipules elliptic-oblong, entire ... 10. *C. commune.*
        - Stipules pectinately lobed ... 11. *C. coccineo-bracteatum.*
    - Stipules (if any) deciduous ... 12. *C. Manii.*
- Leaflets glabrous or nearly so on both surfaces, petals rusty-pilose or pilose outside ... ... 13. *C. Kadondon.*
- Leaflets with the midrib and nerves puberulous on the lower surface.
    - Leaflets not glaucous beneath, entire; drupe less than 1 in. long ... 14. *C. rubiginosum.*
    - Leaflets glaucous beneath, at least when young.
        - Leaflets crenulate or sub-crenulate; drupes 1 in. long ... 15. *C. Kunstleri.*
        - Leaflets obscurely and minutely crenate or serrate, drupes about 2 in. long ... 16. *C. glaucum.*
- Leaflets rusty-tomentose or pubescent on the lower surface, the midrib tomentose on the upper ... ... 17. *C. secundum.*

Of doubtful position.
Male flowers unknown, but probably
near *C. parvifolium* ... ... 18. *C. nitidum.*

1. CANARIUM PLANCHONI, King, A tree, 50 or 60 feet high; young branches glabrous, cinereous. *Leaves* 5 to 10 in. long, stipules deciduous. *Leaflets* 7 to 13, thinly coriaceous, oblong-lanceolate or elliptic-oblong, shortly and bluntly acuminate; the base rounded, slightly oblique; both surfaces glabrous, the upper pale when dry and the nervation obsolete, the lower brown with the 10 to 14 pairs of sub-horizontal nerves slightly prominent; length 2 to 4 in., breadth ·9 to 1·5 in.; petiolules ·15 to ·3 in., the terminal one longer. *Panicles* numerous, slender, axillary, much shorter than the leaves, pale puberulous; the branches distant, ascending, the small flowers crowded near their apices. *Flowers* ·1 in. long, with several very minute deciduous bracteoles just beneath the calyx. *Calyx* campanulate, deeply cleft into 3 ovate, triangular lobes, tomentose outside, glabrous inside. *Petals* slightly larger than the sepals, deltoid, with a short subulate inflected apex, sub-concave, less tomentose outside than the sepals, glabrous inside. *Stamens* 3, connivent; the anthers innate, broadly ovate; filaments shorter than the anthers, flat, dilated at the base and inserted on the edge of the large cupular fleshy disc. *Ovary* in the male flowers imperfect: in the female flowers small, ovate, 3-grooved, glabrous; style terminal, short, 3-grooved, as is the stigma. *Fruit* ovoid, slightly gibbous, globular, glabrous; the persistent style slightly lateral, ·4 to 5 in. long. *Santiria Planchoni*, A. W. Benn. in Hook. Fl. Br. Ind. I, 536; Engler in De. Candolle Monegr. Phanerog. IV, 154.

Malacca: Maingay (Kew Distrib.), Nos. 315, 1972; Griffith, Nos. 1152, 1153. Perak: King's collector, No. 5573; Scortechini, No. 2097.

2. CANARIUM CAUDATUM, King n. sp. A tree 20 to 40 feet high; young shoots pale brown, lenticellate, all parts except the calyx quite glabrous. *Leaves* 8 to 13 in. long, stipules (if any) deciduous. *Leaflets* 5 to 7, coriaceous, oblong to ovate, tapering to both ends, the apex caudate-acuminate, the edges entire and sometimes slightly undulate; both surfaces glabrous, shining, the reticulations distinct on the upper surface, and the 7 to 9 pairs of ascending curving interarching main nerves pale on the lower; length 3 to 6 in., breadth 1·5 in. to 2·25 in., petiolules ·4 to ·5 in., the terminal one 1·2 to 1·6 in. *Male panicles* terminal, narrowly pyramidal, few-branched, shorter than the leaves, the bracteoles (if any) deciduous. *Flowers* few, at the extremities of the branches, ·2 in., long. *Calyx* widely campanulate, the mouth with 3 broad, shallow teeth, minutely pubescent outside, glabrous inside. *Petals* longer than the calyx, imbricate, ovate, acute, the base truncate,

thickened in the middle; the edges thin, both surfaces glabrous. *Stamens* 3; the anthers oblong, shorter than the flattened filaments, the dilated bases of which are attached outside the glabrous fleshy disc from which emerges the oblong tapering rudimentary ovary: style filiform, stigma minute. *Female flowers* not seen. *Ripe drupes* narrowly ellipsoid, slightly clavate, sub-trigonous, 2 to 2·25 in. long and ·6 in. in diam.; persistent calyx small, flat, 3-angled.

Perak: King's collector, Nos. 8554, 10016, 10182, and 10227. Scortechini, No. 454.

This and the next are distinctly separated from all the other hitherto described Malayan species by their triandrous flowers. The leaves and drupes of this are also very characteristic.

3. CANARIUM PARVIFOLIUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. 1. 536. A tree; young branches slender, dark brown, all parts ultimately glabrous except the flower. *Leaves* 6 to 12 in. long; leaflets 5 to 9, coriaceous, oblong-lanceolate to elliptic, acuminate, entire, the base rounded or slightly narrowed, both surfaces shining; nerves 7 or 8 pairs, spreading, invisible above (even when dry) and very faint below, length 2 to 3·5 in., breadth ·8 to 1·6; petiolules ·1 to ·2 in., the terminal one ·35 to ·65 in.; stipules (if any) deciduous. *Panicles* terminal, slender, the branches few, short, few-flowered, bracteolate. *Flowers* ·2 in. long, slightly longer than the pedicels. *Calyx* campanulate; the mouth truncate, quite entire or faintly 3-toothed. *Petals* much longer than the calyx, imbricate, elliptic, obtuse, concave, puberulous on both surfaces. *Stamens* 6, as long as the petals: anthers oblong, much shorter than the filaments which are subulate, much dilated in the lower third and very slightly united at the base. *Rudimentary ovary* ovoid, tapering into the thin cylindric style, glabrous. *Female flowers* unknown. *Ripe drupe* ellipsoid, trigonous, glabrous, 1·5 to 1·75 in. long, and ·8 in. in diam. Engler in DeCand. Monogr. Phanerog. Vol. IV, 140.

Malacca: Griffith, No. 1068; Maingay, No. 353 (Kew Distribution). Perak: King's collector, Nos. 2618 and 7870.

The bases of the filaments in Griffith's No. 1068 are less dilated than in those of Maingay's No. 353, or in those of King's collector's specimens; but in other respects the characters agree. This species in externals much resembles *C. nitidum*, Benn.

4. CANARIUM EUPHYLLUM, Kurz in Journ. As. Soc. Bengal, 1872, Pt. 2. p. 295. A tree 80 to 90 feet high; young shoots very stout, puberulous. *Leaves* 2 to 3 feet long, the stipules (if any) very deciduous. *Leaflets* 11 to 17, membranous, ovate, ovate-oblong or oblong, opposite, very shortly and abruptly acuminate, the edges glandular-serrulate; the base unequal, rounded or sub-cordate; both surfaces

glabrous, minutely reticulate, the upper shining; main nerves 12 to 19 pairs, spreading, rather straight, interarching very near the edge; length 4 to 10 in., the lower leaflets much the smallest; breadth 2 to 3·5 in., petiolules ·35 to ·6 in. *Panicles* shorter than the leaves, axillary, puberulous or glabrous, their branches only 1 or 2 inches long, few-flowered, sub-corymbose. *Flowers* ·4 in. long. *Calyx* shorter than the petals, tubular, cut for half its length into 3 broad blunt teeth, puberulous on both surfaces. *Petals* oblong, concave and thickened at the apex, minutely tomentose outside. *Stamens* 6, the anthers linear-oblong, shorter than the glabrous filaments which for two-thirds of their length are united into a tube; rudimentary ovary truncate, glabrous, with a few hairs on the top. *Female flowers* not seen. *Ripe drupes* ovoid-ellipsoid, not trigonous, glabrous, 1·75 in. long and ·8 in. in diam., peduncles stout; the persistent calyx 3-angled, woody. Kurz For. Flora Burmah. I, 208. A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 535. Engler in DeCand. Monogr. Phanerog. IV., 123.

South Andaman: Kurz, King's collector. Burmah: in North Arakan, Hildebrand.

The leaflets on the same leaf vary much in size and shape; those towards the base being short and broad, while those towards the apex are oblong. This species is closely allied to *C. bengalense*, Roxb., but its calyx is more deeply toothed; its anthers are shorter and broader; and its leaves although very similar in texture, are longer, have thicker rachises, while the leaflets are serrate and not entire. The young branches of this are moreover nearly twice as thick as those of *C. bengalense.*

5. CANARIUM GRANDIFLORUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 533. A tree; young branches stout, pubescent, ultimately glabrous and dark-coloured. *Leaves* 9 to 12 in. long, the rachis glabrous. *Leaflets* thinly coriaceous, 7 to 9, opposite, ovate-lanceolate or elliptic-oblong, acuminate, entire, the base rounded, upper surface glabrous; the lower glabrous or sparsely pubescent, with the 10 to 12 pairs of spreading main nerves prominent; length 3 to 4·5 in., breadth 1·35 to 1·75 in.; petiolules ·2 in. long, the terminal one longer. *Male panicles* little more than half as long as the leaves, puberulous or nearly glabrous, with a few long spreading branches; the flowers few, in distant clusters, shortly pedicelled. *Calyx* shortly campanulate, with 3 broad, blunt teeth, pubescent outside, glabrous inside. *Petals* longer than the calyx, oblong, thick, concave, blunt, pubescent outside, glaberulous inside. *Anthers* linear, longer than the filaments, the latter glabrous, dilated, and forming a short tube, rudimentary ovary hairy. *Female flowers* larger than the male, in axillary racemes, or short panicles with racemose branches; the anthers short, ovate; the filaments as in the male. Ovary broadly ovoid, tapering

into the style and like it rufous-pilose; stigma capitate. *Drupe* narrowly ellipsoid, sub-trigonous, glabrous; stone thick, bony, 1·35 in. long. Engler in DeCand. Monogr. Phanerog. IV., 122.

Malacca: Maingay, (Kew Distrib.), No. 312. Singapore: Hullett No. 516.

This is an imperfectly known species. The only male flowers I have seen of it are those in Mr. Hullett's specimen from Singapore. I have seen no ripe drupes. *Canarium dichotomum*, Miq. (*Pimela dichotoma*, Blume Mus. Lugd. Bat. I, 22) closely resembles this as to leaves. But, as neither Blume nor Miquel describes its flowers, it is impossible to decide whether the likeness goes beyond externals. The specific name of this is unfortunate. The flowers described by the author of it are females, and they are not larger than the female flowers of many other species, while they are much smaller than those, for example, of *C. rufum*, Benn.

6. CANARIUM PILOSUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 533. A tree 30 to 60 feet high; young branches rufous-pubescent, with strigose hairs intermixed. *Leaves* 12 to 18 in. long. *Leaflets* 3 to 7, thinly coriaceous, opposite, oblong-lanceolate to elliptic, sometimes slightly obovate, shortly and abruptly acuminate, entire or obscurely crenulate; the base cuneate, slightly unequal-sided; both surfaces when young sparsely hispid, when adult almost glabrous except the midrib and 12 or 13 pairs of slightly prominent spreading nerves which are sparsely hispidulous; reticulations distinct beneath; length 4·5 to 5·5 in., breadth 1·5 to 2·5 in.; petiolules ·15 to ·25 in., the terminal one more than 1 in.; stipules in pairs, subulate, hairy. *Male racemes* axillary, about 6 in. long, hispidulous, interrupted. *Flowers* about ·5 in. long, pedicellate, few. *Calyx* much shorter than the corolla, tubular, its mouth nearly entire, minutely tomentose on both surfaces. *Petals* narrowly oblong, thickened and wider upwards, puberulous on both surfaces. *Anthers* linear, about half as long as the filaments which are linear, flattened and united into a tube for about one-third of their length; rudimentary ovary very short, rufous-pilose. *Female flowers* unknown; the fruiting racemes only about 4 in. long, nearly glabrous. *Drupes* narrowly ellipsoid, sub-trigonous, glabrous, 1 in. long, and ·5 in. in diam. (unripe). Engler in DeCandolle, Monogr. Phanerog. IV. 121. Wall. Cat. No. 8100.

Malacca: Maingay (Kew Distrib.) No. 302. Singapore: Wallich. Perak: Scortechini No. 424.

This species is very closely allied to *C. hirtellum*, the chief differences being (1) that the calyx of the male flowers of this is almost entire, while in those of *C. hirtellum*, the calyx is deeply 3-toothed; and (2) that the leaves of this are when young hispidulous, and when adult nearly glabrous; while those of *C. hirtellum* are more or less densely pubescent beneath at all stages.

7. CANARIUM HIRTELLUM A. W. Benn. in Hook. fil. Fl. Br. Ind. I. 534. A tree 40 to 60 feet high: the young branches, rachises and under surfaces of the leaves and the inflorescence more or densely rufous-pubescent or tomentose. *Leaves* 9 to 15 in. long: *leaflets* 5 to 7, the the pairs opposite, coriaceous, elliptic, shortly and rather abruptly acuminate, entire or minutely serrulate, the base rounded or sub-cuneate; upper surface shining, reticulate, sparsely hispidulous, the midrib tomentose; main nerves 11 to 13 pairs, spreading, curving, prominent on the lower, depressed on the upper surface; length 4 to 7 in., breadth 1·5 to 3 in.; petiolules ·1 to ·2 in., that of the terminal one ·5 to ·75 in. *Male flowers* in axillary or terminal racemes or panicles much shorter than the leaves. *Flowers* ·4 in. long, on short stout pedicels, mostly crowded near the ends of the branchlets. *Calyx* campanulate, with 3 broad blunt teeth, tomentose on both surfaces but especially on the outer. *Petals* longer than the calyx, oblong, concave, thickened upwards, sericeous outside, glaberulous within. *Anthers* linear, about one-third as long as the glabrous flattened filaments which are united into a tube for half their length; rudimentary ovary very small, rufous-sericeous. *Female flowers* not much larger than the males, the stamens shorter than the pistil, the free part of the filaments very short, the anthers with pubescent edges. *Ovary* broadly ovoid, densely rufous-sericeous; the style about as long, sparsely pubescent. *Stigma* capitate, 3-lobed. *Ripe drupe* narrowly ellipsoid, trigonous, glabrous, 1 to 1·25 in. long, and ·4 to ·5 in. in diam. Engler in De Candolle Monog. Phanerog. IV, 121; Hooker Icones Plantar. No. 1575. Wall Cat. 8102 and 9047.

Penang; Wallich, Curtis, Nos. 656, 2251. Selangor: Ridley, No. 1869. Perak: King's collector, Wray; common.

8. CANARIUM RUFUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. Vol. 1, 533. A tree 60 to 100 feet high: young branches, inflorescence, petiolules and under surfaces of the leaves rusty-tomentose. *Leaves* 12 to 15 in. long, the rachises glabrous when adult. *Leaflets* 7 to 11, very coriaceous, opposite, elliptic or broadly oblong, shortly and abruptly acuminate, the edges serrate-dentate to the broad rounded sometimes slightly oblique base; upper surface glabrous except the tomentose midrib, shining, the lower boldly and minutely reticulate: main nerves 12 to 15 pairs, spreading, very prominent beneath; length 3 to 6 in., breadth 2 to 2·75 in., the lowest leaflets the smallest; petiolules ·3 to ·4 in., that of the terminal leaflet 1·25 to 1·5 in.; stipules not seen. Male

branches terminal, shorter than the leaves, very stout, the lateral branches very short, the flowers in dense bracteate clusters at their apices: bracts numerous, broadly ovate, blunt, concave, tomentose outside. *Calyx* very coriaceous, narrowly campanulate with 3 short blunt teeth, sericeous-tomentose on both surfaces. *Petals* longer than the calyx, oblong, concave, tomentose outside except the glabrous edges, glabrous inside. *Stamens* 6: the anthers linear, slightly longer than the filaments which are much dilated in the lower half and slightly united at the base into a short tube inserted outside the fleshy disc; rudimentary ovary short, broad, glabrous. *Female panicles* shorter than the male, but the flowers at least twice as large (·5 in. long); the petals narrower, the anthers much shorter than in the males and the filaments completely united for one-third of their length into a tube; ovary depressed-globular, tomentose, narrowing into the thick tomentose style: stigma discoid. *Ripe drupe* narrowly ellipsoid, sharply 3-angled, glabrous, the apex rather blunt, 2·5 to nearly 3 in. long, and 1 to 1·3 in. in diam. Engler in De Cand. Monog. Phanerog. IV, 107.

Malacca: Griffith, No. 1143, Maingay, No. 301. Perak: King's collector, Wray, Scortechini; common.

A very distinct species recognizable at once by its very coriaceous many-nerved rusty leaflets, large flowers, and boldly trigonous fruits.

9. CANARIUM PURPURASCENS, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 532. A tree 50 to 70 feet high: young branches densely rusty-puberulous. *Leaves* 8 to 14 in. long; stipules rotund-cordate, rusty-pubescent. *Leaflets* 7 to 9, coriaceous, oblong to elliptic-oblong, rarely obovate-oblong, entire, or slightly serrate towards the abruptly acuminate apex, the base slightly narrowed, upper surface glabrous shining; the lower glabrous and glaucescent, often with a few scattered hairs: main nerves 10 to 14 pairs, spreading; length 2·5 to 5·5 in., breadth 1 to 2 in.; petiolule ·2 to ·25 in., that of the terminal one 1 in. or more. *Male inflorescence*; a racemose panicle often branched, rusty tomentose, 9 to 18 in. long; the ultimate branches few flowered branched cymules. *Bracts* ovate, tomentose, larger than the flower-buds, deciduous; flowers ·25 in. long. *Calyx* tubular, tomentose, with 3 broad shallow teeth. *Petals* broadly oblong, acute, concave, tomentose outside, glabrous inside. *Stamens* 6; the filaments much shorter than the narrowly oblong puberulous anthers, dilated at the base and slightly united so as to form a short tube. Disc none. *Rudimentary ovary* turbinate, glabrous, dark-coloured. *Female flowers* ·5 in. long, in stout few-flowered racemes or panicles only 2 to 4 or 5 in. long; ovary globular-ovoid, pubescent, narrowed into a short thick style: stigma large, capitate, 3-lobed. *Drupe* elliptic-ovoid, rather blunt at each end,

sub-trigonus, glabrous, 2 in. long and 1·15 in. in diam. Engler in De. Cand. Monog. Phan. IV, 115. Canarium, Wall. Cat. 9046.

Malacca: Griffith (Kew Distrib.) No. 1142, Derry. Singapore: Wallich, Ridley. Penang: Curtis, Nos. 803, 862, 959, 2708. Perak: Scortechini, No. 175, King's collector, Nos. 6181, 7885.

10. CANARIUM COMMUNE, Linn. A very tall tree: young branches pale puberulous, or almost glabrous. *Leaflets* 7 to 9, sub-coriaceous, ovate-elliptic, acuminate, entire, the base sub-cuneate, both surfaces glabrous; main nerves 10 to 14 pairs, spreading, rather prominent; length 3 to 5 in., breadth 1·3 to 2 in., petiolules about ·5 in.; stipules persistent, elliptic-oblong, puberulous, veined, about 1 in. long. *Panicles* terminal, lax, spreading, minutely puberulous; the flowers clustered at the apices of the branches, their buds enclosed in rotund, very concave, minutely tomentose bracts. *Calyx* campanulate, broadly 3-lobed. *Petals* 3, ovate-rotund, concave. *Stamens* 6, the filaments shorter than the anthers, free; rudimentary pistil (in the male flower) hairy. *Ovary* (in female flower) oblong-globular, glabrous, the style short and thick; stigma 3-lobed (fide Kænig). *Fruit* ellipsoidal, sub-trigonous, the stone bony, 1-to 3-celled, 2 in. or more long and 1 to 1·25 in. in diam. Kœnig, Ann. Bot. i. 360, t. 7, f. 2; Roxb. Fl. Ind. iii. 137; Blume Mus. Bot. i. 214; Bijd. 1161; DC. Prodr. ii. 79; W. & A. Prodr. 175; Miq. Fl. Ind. Bat. vol. i. pt. 2, 643; Wall. Cat. 8493. Benn. in Hook. fil. Fl. Br. Ind. I, 531. *Sapindus travancorensis*, Wall. Cat. 8047.

Planted in Penang, Singapore and some of the other provinces, but apparently never wild.

Kœnig in his description, which is a very full one, states that the stipules are "crenate, toothed or sometimes fringed." In all the specimens accepted as *C. commune* which I have seen the stipules are entire, and Rumphius thus figures them. For this has well as for other reasons, I suspect that more than one species is included under the name *C. commune.* L.

11. CANARIUM COCCINEO-BRACTEATUM, Kurz in Journ. As. Soc. Bengal for 1872, pt. 2, p. 296. A tree: young branches stout, minutely pale-pubescent. *Leaves* 10 to 18 in. long: stipules rather large, puberulous, pectinately lobed. *Leaflets* 5 to 9, opposite, subcoriaceous, broadly ovate, oblong-ovate to oblong, shortly acuminate, setaceous-serrulate or entire on the same tree; the base oblique, rounded, or sub-cuneate: both surfaces glabrous; main nerves 10 to 12 pairs, slightly prominent beneath; length 3·5 to 7·5, breadth 2 to 3 in.; petiolules ·2 to ·4 in., the terminal one 1·5 in. *Panicles* axillary, shorter than the leaves, deciduously puberulous, their branches rather long and spreading; the flowers crowded towards their apices, rather numerous; bracts longer than the

buds, ovate or oblong-acuminate, tomentose outside, scarlet. *Flowers* ·3 in. long, on pedicels about as long as themselves, sub-globose. *Calyx* campanulate, with three deep broad teeth, tomentose outside, glabrous inside. *Petals* longer then the calyx, valvate, ovate, obtuse, puberulous outside, glaberulous inside. *Stamens* 6; the anthers oblong, about as long as the free flattened glabrous filaments which rise from the edge of the fleshy corrugated disc: rudy. ovary minute. *Female flowers and drupe unknown.* Kurz For. Flora Burmah I, 209; A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 536. Engler in De Cand. Monogr. Phanerog. IV, 149.

South Andaman: Kurz, King's collectors.

12. CANARIUM MANII, King, n. sp. A tree: young branches slender, pale brown, scurfy-puberulous. *Leaves* 9 to 12 in. long, stipules (if any) deciduous. *Leaflets* 5 to 7, thinly coriaceous, ovate or ovate-rotund, shortly acuminate, entire; the base very broad, rounded or sub-cordate, never narrowed; both surfaces quite glabrous, shining, the reticulations minute: main nerves about 10 pairs, spreading, rather straight, slightly prominent beneath; length 3·25 to 4·5 in., breadth 1·5 to 2·75 in.; petiolules ·2 to ·4 in., the terminal one longer. *Panicles* terminal, slender, shorter than the leaves, minutely pubescent; their branches short (1 in. long), corymbose. *Flowers* ·25 in. long, few; buds globular, each with an oblong, obtuse tomentose bract longer than itself. *Calyx* tomentose, widely campanulate, with 3 broad, shallow teeth. *Petals* slightly longer than the calyx, broadly ovate, sub-acute, minutely pubescent externally, glabrous internally. *Stamens* 6, anthers oblong, shorter than the free glabrous slightly flattened filaments which are inserted outside the glabrous fleshy lobed disc.; ovary none. *Female flowers* unknown. *Ripe drupes* ovoid-ellipsoid, glabrous, not trigonous, 1 to 1·25 in. long and ·6 in. in diam.; the woody persistent calyx flat and 3-angled.

South Andaman Island: Man, King's collectors.

This resembles *C. euphyllum*, Kurz in its fruit, but has very different leaves and panicles: the bracts of the inflorescence in this are moreover brown, not scarlet.

13. CANARIUM KADONDON, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 535. A tree, young branches glabrous. *Leaves* 6 to 12 (rarely 15) in. long; their rachises terete, nearly glabrous, stipules (if any) deciduous. *Leaflets* 7 to 9, elliptic-oblong to elliptic, obtusely acuminate, entire, both surfaces glabrous or nearly so, the base often unequal rounded or sub-cuneate; main nerves 6 to 9 pairs, spreading, incurved, slightly prominent beneath; length 2·5 to 5 in., breadth 1 to 2·25 in; petiolules ·35 to ·5 in., the terminal twice as long. *Panicles* sparsely rusty-

tomentose; the lateral branches short and corymbose, minutely bracteolate. *Flowers* globose in bud, about as long as the pedicels; bracteoles minute, subulate. *Calyx* fleshy, cup-shaped, shortly pilose outside, the mouth with three shallow broad teeth. *Petals* valvate, rotund, densely ferruginous, pilose outside, pubescent inside. *Stamens* 6; the anthers broadly ovate, about as long as the filaments which are dilated at the base, free, and inserted outside the broad fleshy lobed glabrous disc. *Ovary* ovoid, glabrous, stigma (in the bud)-sub-sessile. *Ripe drupe* ellipsoid-ovoid, apiculate, not trigonous, glabrous, 1·15 in. long and ·6 in. in diam. Engler in DeCand. Monogr. Phanerog. IV., 138.

Malacca: Maingay (Kew Distrib.) No. 365. Perak: King's collector, many numbers. Penang: Curtis Nos. 495, 1432, 1433, 1434; Hullett, No. 186. Pahang: Ridley No. 2575.

A species distinguishable by its globular buds; its petals densely rufous-pilose externally; and by the long slender petiolules of the leaflets.

14. CANARIUM RUBIGINOSUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 534. A tree: young branches and inflorescence minutely tawny-tomentose. *Leaves* 9 to 12 in. long, the rachises glabrous when adult; stipules (if any) deciduous. *Leaflets* 5 to 7, coriaceous, elliptic-oblong, shortly and obtusely acuminate, entire, the base rounded or slightly narrowed; both surfaces glabrous when adult, the lower puberulous along the stout midrib and 10 to 13 pairs of spreading curving main nerves, the reticulations also distinct: length 3·5 to 4·5 in., breadth 1·25 to 2 in.; petiolules ·6 in., the terminal one 1·5 in. *Panicles* of male flowers terminal and axillary, 4 to 10 in. long, the branchlets bearing the flowers at their extremities in condensed many-flowered dichotomous cymes. *Buds* globular, ·1 in long, longer than the stout pedicels. *Calyx* a shallow entire cup. *Petals* deltoid, valvate, concave, much exceeding the calyx, minutely tawny-tomentose outside, glabrescent inside as is the calyx. *Stamens* 6, shorter than the petals, inserted on the outside of the lobed cushion-like fleshy disc; the anthers oblong, about as long as the flat free filaments. *Female flowers* unknown. *Ripe drupe* ellipsoid, nearly 1 in. long, and ·6 in. in diam., obscurely trigonous, glabrous. Engler in DeCandolle Monogr. Phanerog. IV, 136.

Malacca: Maingay (Kew Distrib) No 309.

15. CANARIUM KUNSTLERI, King, n. sp. A tree 60 to 70 feet high: young branches rather stout, pale brown, minutely and deciduously scurfy-tomentose. *Leaves* 14 to 20 inches; stipules deeply laciniate, puberulous, persistent. *Leaflets* 7 to 11, sub-coriaceous, oblong to elliptic-oblong, shortly acuminate, the edges crenulate or sub-entire; the base rounded or sub-cuneate, slightly oblique; upper surface glabrous, the lower glaucous (at least when young), puberulous on the

midrib and nerves, minutely scaly; main nerves 12 to 15 pairs, spreading, curving, rather prominent beneath; length 4 to 8 in., breadth 2·25 to 3·25 in.; petiolules ·3 to ·4 in., the terminal one twice as long. *Male panicles* terminal, rusty-puberulous, 10 to 12 in. long, spreading, compound, the flowers crowded on the ultimate branchlets; the pedicels short, tomentose, each with 1 or 2 oblong tomentose brown bracteoles which are longer than the globular buds. *Flowers* ·3 in. long. *Calyx* shorter than the petals, cut nearly to the base into 3 ovate obtuse spreading lobes, tomentose outside, puberulous inside. *Petals* ovate, tapering to each end (sub-rhomboid), the outer surface keeled, tomentose with glabrous edges, the inner glabrous. *Stamens* 6; anthers oblong, shorter than the slightly flattened free filaments which are inserted outside the glabrous corrugated disc; ruddy; ovary minute or 0. *Female panicles* as large as the male, fewer-flowered and the flowers larger, the bracts at the bases of the branches laciniate; *stamens* rudimentary; ovary ovoid, style short, thick, both glabrous, stigma large and faintly 3-lobed. *Ripe drupes* ellipsoid, rather blunt at each end, glabrous, very slightly trigonous, 1 in. long and ·6 in. in diam., the style persistent; the pedicel stout, ·6 to ·8 in. long, bearing several persistent bracteoles.

Perak: King's collector Nos. 7041, 7393 and 7509; Curtis, No. 2710.

The nearest ally of this is *C. denticulatum*, Blume, but that has much shorter filaments and smaller leaves; its fruit is unknown.

16. CANARIUM GLAUCUM, Blume Mus. Bot. Lugd. Bat. I, 219. A tree 40 to 60 feet high: young branches rather slender, lenticellate, deciduously rusty-puberulous. *Leaves* 12 to 15 in. long, the rachis at first rusty-puberulous, ultimately glabrous. *Leaflets* 7 to 9, oblong or elliptic, acute or shortly acuminate, the edges obscurely and minutely crenate or serrate or sub-entire; upper surface glabrous, the midrib pubescent; the lower glaucous, rusty-pubescent on the midrib and sometimes on the 10 to 14 pairs of rather prominent spreading main nerves. *Stipules* rotund-reniform, ·4 in. long. *Panicles* terminal, the male as long as, or longer than the leaves, with lax spreading branches which become shorter upwards. *Male flowers* ·2 in. long., in small bracteate clusters at the ends of the branchlets; bracteoles broadly ovate, tomentose outside, deciduous. *Calyx* campanulate with 3 broad shallow blunt teeth. *Petals* longer than the calyx, broadly ovate-oblong, concave, tomentose outside and glabrescent within like the calyx. *Stamens* 6, the filaments shorter than the anthers, free, dilated at the base, attached outside the glabrous disc; rudimentary ovary glabrous. *Panicles of female flowers* shorter than the males, but the flowers two or three times as large. *Ovary* globose and glabrous below, grooved and pubescent upwards and tapering into the style.

Stigma large, capitate, 3-grooved. *Ripe drupe* ellipsoidal, tapering to the top, glabrous and shining, 1·75 to 2·25 in. long and 1 to 1·25 in. in diam., the persistent thickened calyx forming an open sub-entire cup at its base.

Penang: Curtis Nos. 803, 862, 2708. Perak: King's collector, No 7885.

17. CANARIUM SECUNDUM, Benn. in Hook. fil. Fl. Br. Ind. I, 532. A tree 30 to 50 feet high; young branches slender, and like the rachises under surfaces of the leaves and inflorescence rusty-tomentose or pubescent. *Leaves* 12 to 18 inches long; leaflets 7 to 9, thinly coriaceous, oblong, shortly caudate-acuminate, minutely serrate-dentate to sub-entire, the base rounded or slightly cuneate, upper surface glabrous except the minutely tomentose midrib; the lower much reticulate; main nerves 10 to 15 pairs, obscure above, bold beneath, curved, spreading; length 3 to 6 in., breadth 1·6 to 2 in.; petiolules of lateral leaflets only ·2 to ·3 in., those of the terminal one twice as long. *Stipules* reniform, densely tomentose outside, ·35 in. long, and about ·5 in. broad. *Panicles* terminal, rather slender, 10 to 18 in. long, and with lateral branches several inches long at the extremities of which the flowers are crowded in little heads; bracts numerous, more or less ovate or oblong, rusty-tomentose, enveloping the buds. *Flowers* sub-sessile. *Calyx* with 3 broad lobes. *Petals* oblong, sub-acute, concave, rusty-tomentose outside, glabrous within. *Stamens* 6, the narrowly oblong anthers longer than the dilated filaments which are inserted outside the disc. *Disc* adherent to the ovoid glabrous rudimentary ovary. *Female flowers* unknown. *Drupe* elongated-ovoid, sub-trigonous, sub-acute, glabrous, about 2 in. long and 1 in. in diam., the pedicel stout and the persistent calyx 3-angled. Engler in DeCand. Monogr. Phanerog. IV., 116. *Canarium*, Wall. Cat. 9046. ? *C. Bennettii*, Engler in DeCand. l. c. 119.

Singapore: Wallich, Hullett, Ridley No. 1812, King's collector No. 345. Malacca: Griffith No. 1141 and 1145, Maingay, No. 300 (Kew Distrib.). Perak: King's collector, Nos. 4330, 6101, 7610 and 10722; Scortechini, No. 2081.

This is allied to *C. rufum*, A. W. Benn., but its leaflets are thinner and the panicles much longer and more slender, with longer branches; and the drupe is much less distinctly trigonous. Dr. Engler has founded his species *C. Bennettii* on Griffith's specimen No. 1141. But on dissection of the flowers of the single specimen of that number in the Calcutta Herbarium, I cannot find that they differ from those of the same collector's No. 1145 which Engler refers to. *C. secundum*, Bennet and I therefore venture to reduce his species to this. The filaments are slightly conjoined at the base and appear as if joined into a tube, but they are easily separable.

16. CANARIUM NITIDUM, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 532. A tree 30 to 50 feet high; young branches at first puberulous, but speedily glabrous. *Leaves* 7 to 12 in. long, glabrous, the rachis slender and the petiolules rather long. *Leaflets* 7 to 9, coriaceous, shining, oblong, shortly acuminate, quite entire, the base rounded or slightly narrowed; main nerves 7 to 9 pairs, spreading, almost horizontal, very faint; length 3·5 to 6·5 in., breadth 1·2 to 1·8 in.; petiolules ·4 to ·6 in., that of the terminal leaflet 1 to 1·5 in.; stipules deciduous (not seen). *Fruit* in short terminal racemes: the drupes when ripe ovoid, tapering to each end, glabrous, 1·25 to 1·75 in. long, and about 1 in. in diam. Engler in De Cand. Monog. Phaner. IV, 108; Wall Cat. 8546 *in part.*

Singapore: Wallich. Malacca: Griffith 1147; Maingay No. 358, (Kew Distrib). Perak: King's collector, Nos. 4604, 4263, 5658 and 10916.

Male flowers of this are not known. The ripe drupe is much more ovoid than in the majority of the species, and this is the character by which, so far as the material goes (for male flowers of this are unknown) it is most readily distinguished from *C. parvifolium*, Benn. A flowering specimen recently collected in Singapore by Mr. H. M. Ridley (No. 3799) may belong to this. Ripe fruit from the same tree is required to settle the matter.

2. TRIGONOCHLAMYS, Hook. f.

A tree with pustulate tomentose-pubescent branches. *Leaves* alternate, imparipinnate, with opposite petiolulate leaflets. *Flowers* polygamous. *Calyx* large, keeled, with 3 large connivent valvate segments. *Petals* 3, valvate, about equalling the calyx. *Disc* annular. *Stamens* 6, inserted on the margin of the disc; filaments very short. *Ovary* 3-celled, nearly globose; style straight, short, stigma 3-lobed; ovules 2 in each cell, axile. *Drupe* obliquely globose, 1-celled, 1-seeded.—A single Malayan species.

1. TRIGONOCHLAMYS GRIFFITHII, Hook. fil. in Trans. Linn. Soc. XXIII, 170, t. XXVII. A tree 50 to 100 feet high: young branches rather slender, sparsely lenticellate, rusty-puberulous. *Leaves* 6 to 12 in. long, their rachises minutely tomentose; leaflets 13 to 15, thinly coriaceous, oblong-lanceolate, acuminate, entire, the base rounded or slightly narrowed: upper surface glabrous except the tomentose midrib, pale when dry; the lower sparsely pubescent, pale brown when dry and the 13 to 15 pairs of sub-horizontal main nerves rather prominent:

length 1·5 to 3 in., breadth ·65 to ·1 in. *Panicles* shorter than the leaves, few-flowered, rusty-tomentose; branchlets and pedicels with linear-oblong bracts. *Flowers* polygamous, ·35 in. long. *Calyx* large, keeled, with 3 deep broad triangular connivent rusty-tomentose segments. *Petals* narrowly elliptic, slightly exserted, densely pale tomentose with a glabrous spot on the base inside. *Stamens* 6, inserted by short filaments on the edge of a thin hypogynous annular glabrous disc, very small in the pistillate flowers. *Ovary* depressed sub-globular, glabrous, the style basi-lateral; the stigma depressed, capitate, obscurely 3-lobed. *Drupe* obliquely sub-globose, glabrous, about ·5 in. in diam. Bennet in Hook. fil.Fl. Br. Ind. I, 539. *Santiria Griffithii*, Engler in DC. Monog. Phanerog. IV, 155.

Malacca; Griffith, No. 1148; Maingay (Kew distrib.) No. 316. Perak; King's collector Nos. 4625, 1828, 8817.

4. SANTIRIA, Blume.

Reziniferous trees. *Leaves* alternate, 3-foliolate or imparipinnate, firm; leaflets opposite, slightly oblique, entire. *Flowers* in uniformly hermaphrodite, axillary or terminal branched panicles; the stipules, (if any) fugacious, bracts usually obsolete, bracteoles minute. *Calyx* cupuliform, 3-lobed or 3-fid, valvate. *Petals* 3, valvate or sub-imbricate, broad and truncate at the base, exceeding the calyx. *Disc* annular, fleshy, adnate. *Stamens* 6, distinct, usually inflexed, inserted on the margin or outside of the disc. *Ovary* 3-celled, with 2 ovules in each cell; style short, stigma capitate or 3-lobed. *Drupe* ellipsoidal or sub-globose, more or less laterally compressed on the ventral side, and the scar of the stigma usually lateral or basal, 1-celled, 1-seeded; the stone crustaceous, rarely woody, *Cotyledons* contortuplicate.—DISTRIB. Malayan Archipelago. Species probably 35.

Panicles longer than the leaves.
  Panicles and leaves glabrous; leaflets 9 to 20 in. long ... ... 1. *S. floribunda.*
  Panicles hispidulous-pubescent; leaflets sparsely hispidulous on the lower surface 4 to 8 in. long flowers on long slender pedicels ... ... 2. *S. laxa.*
  Panicles puberulous; leaflets glabrous; leaflets 3 to 9 in. long flowers on short pedicels ... ... 3. *S. fasciculata.*

Panicles shorter than the leaves.

Panicles solitary, axillary or terminal, with rather long peduncles.

Branches of the panicles few, lax, slender, very long and bearing the flowers on short distant cymules ... 4. *S. puberula.*

Branches of the panicle numerous, stout, divaricate; the flowers in corymbose cymes towards their apices.

Flowers ·2 to ·25 in. long; ripe fruit more than 1 in. long ... 5. *S. macrocarpa.*

Flowers ·1 in. long or less: ripe fruit ·6 to ·7 in. long.

Flower-buds conical ... 6. *S. lævigata.*

Flower-buds globular ... 7. *S. oblongifolia.*

Panicles sessile, branching from the base, sometimes more than one from a leaf-axil.

Leaflets quite glabrous.

Scar of stigma terminal in the ripe fruit; leaflets narrowly oblong, their main nerves 12 to 14 pairs ... ... 8. *S. longifolia.*

Scar of stigma of ripe fruit approximated to its base.

Leaflets oblong to elliptic-oblong; nerves 10 to 15 pairs ... ... 9. *S. Wrayi.*

Leaflets elliptic-oblong to ovate; nerves about 8 pairs or fewer ... ... 10. *S. apiculata.*

Leaflets more or less hairy beneath.

Leaflets quite glabrous on the upper surface.

Lower surface of leaflets boldly reticulate and rusty-pubescent ... ... 11. *S. costata.*

Lower surface not conspicuously reticulate, rusty-puberulous when young; main nerves about 10 pairs 12. *S. conferta.*

Leaflets glabrescent on the upper surface, the midrib tomentose; lower surface densely rusty-tomentose; main nerves 15 to 20 pairs ... ... 13. *S. multiflora.*

1. **Santiria floribunda**, King n. sp. A tree 20 to 30 feet high: young branches stout, scurfy, rusty-pubescent. *Leaves* 2 or 3 feet long, the rachises flattened and channelled on the upper surface below the lowest leaflets, auricled at the very base, puberulous at first but speedily glabrous. *Leaflets* 13 to 15 or 17, coriaceous, oblong, shortly acuminate; the base rounded, slightly unequal; glabrous on both surfaces, the midrib alone sometimes puberulous on the lower, reticulations minute; main nerves 20 to 30 pairs, spreading, curving at the tips, interarching but slightly; length 9 to 20 in., breadth 2·35 to 5 in.; petiolules very stout, 5 to 7 in. long. *Panicles* 2 to 3 feet long, slender, much branched, striate, glabrous, bearing numerous scattered horizontal short branchlets ·5 to 1·5 in. long which bear two or three 3- to 5-flowered cymules. *Flowers* 1 in. long; their pedicels longer, unequal, slender, puberulous, with a few subulate bracteoles at the base. *Calyx* flat, 3-angled, glabrescent. *Petals* erect, deltoid, fleshy, concave, keeled along the middle, glabrous outside. *Stamens* 6, the filaments shorter than the oblong anthers, slightly dilated below, inserted on the outer surface of the edge of the thick fleshy cupular disc. *Ovary* small. *Style* short, stout, 3-angled like the stigma. *Ripe drupes* elliptic, apiculate, glabrous, ·8 in. long and ·5 in. in diam; the peduncles slender, ·5 to ·75 in. long; stigmatic scar terminal.

Perak: King's collector, Nos. 7510, 7632 and 10151.

There are in the Calcutta Herbarium flowering specimens of a species closely allied to this; but in the absence of fruit I hesitate to describe it.

2. **Santiria laxa**, King. A tree 50 to 70 feet high: young branches, rachises of the leaves, and the inflorescence densely clothed with rusty, hispidulous, spreading and mostly deciduous hairs. *Leaves* 14 to 22 in. long, the stipules (if any) deciduous. *Leaflets* 7 to 9, oblong to oblong-elliptic, sometimes slightly obovate, shortly and abruptly acuminate, the edges entire, the base often unequal-sided, cuneate: length 5 to 8 in., breadth 1·75 to 2·5 in., petiolule ·4 or ·5 in.; both surfaces reticulate, the upper glabrous, the lower sparsely hispidulous especially on the midrib and nerves: main nerves 12 to 14 pairs, slightly prominent on the lower surface, spreading, curving, interarching near the edge. *Panicles* usually much longer than the leaves, terminal, their branches short, lax, rather few-flowered, the ultimate branchlets gla-

brous, the larger hispidulous-pubescent. *Flowers* ·3 in. in diam., glabrous, shorter than the slender minutely bracteolate pedicels. *Calyx* with 3 broad, spreading, very blunt teeth, much shorter than the corolla. *Petals* 3, thick, slightly keeled on the back, ovate, obtuse. *Stamens* 6, free, about as long as the petals, inserted on the outer margin of the 6-lobed, glabrous, cushion-like disc; anthers ovate, about as long as the thick rather flattened filaments: rudimentary ovary submerged in the disc, small, sub-cylindric, glabrous as is the thick fluted style; stigma 3-lobed. *Female flowers* unknown. *Ripe drupes* narrowly ellipsoid, trigonous, one side wider and flatter than the other two, glabrous, 1 to 1·4 in. long and ·6 to ·7 in. in diam; stone thin. *Canarium laxum*, A. W. Benn. in Hook. fil. Fl. B2. Ind. I. 535; Engler in DeCand. Monog. Phanerog. IV, 139.

Malacca; Maingay (Kew Distrib.,) No. 366. Perak: King's collector, Nos. 3192 and 3516. Penang: Curtis No. 1431. Pahang; Ridley No. 2451.

The drupes of this have the remains of the stigma terminal, and in this respect they agree technically with the diagnosis of *Canarium.* But they are not equally 3-sided as in that genus, one side being wider and more rounded than the other two. The structure of the flower is not at all that of *Canarium*, and I therefore transfer the species to *Santiria.*

3. Santiria fasciculata, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 539. A tree 40 to 50 feet high: young branches at first rusty-pubescent, becoming glabrous, the bark pale cinereous. *Leaves* 10 to 15 in., the rachis terete, at first puberulous, afterwards glabrescent, slightly flattened on the upper surface near the base. *Leaflets* 5 to 7, membranous, elliptic to elliptic-oblong, more or less caudate-acuminate, the base cuneate, both surfaces glabrous; main nerves 7 or 8 pairs, spreading, much curved, interarching, bold and prominent on the lower, inconspicuous on the upper surface; length 4·5 to 9 in., breadth 2 to 3 in; petiolules ·75 to 1 in., much thickened at each end, the terminal one much longer. *Panicles* slender, puberulous, terminal, as long as or longer than the leaves, with few long, narrow, angular, lax branches bearing at intervals short 6- to 10-flowered cymules. *Flowers* ·05 in. long; the pedicels unequal, tomentose, bracteolate. *Calyx* cupular, hispid-tomentose outside with 3 bold, deltoid, acute teeth. *Petals* imbricate, slightly longer than the calyx, deltoid, glabrescent. *Stamens* 6, filaments about as long as the broadly ovate anthers and inserted outside the edge of the ring-like glabrous disc. *Ovary* ovoid, glabrous. *Ripe drupes* narrowly and obliquely ovoid, flattened on one side, slightly gibbous at the base, glabrous, the scar of the stigma terminal, ·8 in.

long and ·6 in. in diam. Engler in DeCand. Monogr. Phanerog. IV, 164.

Malacca: Maingay (Kew Distrib.) No. 307. Penang; Curtis No. 1544. Perak: King's collector, Nos. 3123, 3319, 3716, 3500, 6610; Scortechini No. 1988.

4. SANTIRIA PUBERULA, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 537. A tree 30 to 50 feet high: young branches slender, pale gray, at first puberulous afterwards glabrous. *Leaves* 8 to 10 in. long, the rachises glabrescent or glabrous, terete, flattened on the upper surface just above the base. *Leaflets* 5 rarely 7, thinly coriaceous, elliptic to oblong, acute or shortly acuminate, the base slightly cuneate; upper surface quite glabrous; the lower minutely puberulous, reticulate, the 9 to 11 pairs of spreading, curving, interarching nerves prominent: length 4 to 6 in., breadth 1·5 to 2·5 in.; petiolules ·4 to ·6 in. long, the terminal one 1 to 1·75 in., all swollen at the upper end. *Panicles* terminal or axillary, shorter than the leaves, minutely tomentose, with a few lax spreading branches bearing rather distant, 5- to 8-flowered, sub-sessile cymules. *Flowers* about ·05 in. long, the pedicels about as long, unequal, stout, tomentose. *Calyx* cupular; with 3, deltoid, acute teeth, tomentose outside. *Petals* valvate, ovate-rotund, concave, with a slight inflected point at the apex, glabrous, much longer than the calyx. *Stamens* 6; filaments longer than the ovate anthers, inserted on the edge of the crenulate fleshy disc: ovary ovoid, glabrous. *Ripe drupes* narrowly ellipsoid, straight on one side, curved on the other, obscurely 3- or 4-angled, glabrous, the scar of the stigma terminal; length ·75 in., diam. ·35 in. Engler in DC. Mon. Phan. IV, 161.

Perak: Wray, No. 3210: King's collector, No. 3438, 3529, 6832.

This comes very near to *S. fasciculata*, A. W. Benn., and I much doubt its being really distinct from that species.

5. SANTIRIA MACROCARPA, King n. sp. A glabrous tree, 40 to 70 feet high: young branches with brown lenticellate bark. *Leaves* 5 to 9 in. long, the rachis slightly flattened on the upper surface near the base. *Leaflets* thinly coriaceous, oblong-elliptic to obovate or sub-rotund, very shortly and bluntly apiculate; the base cuneate, rarely rounded; main nerves 7 or 8 pairs, spreading, slightly curved, interarching boldly, slightly depressed on the upper surface (when dry) and sub-prominent on the lower; length 3 to 4·75 in., breadth 2 to 2·75 in.; petiolules ·35 to ·5 in., the terminal one 1 in. or more. *Panicles* axillary, solitary, shorter than the leaves, with distant lateral branchlets ·5 to 1 in. long and bearing at their apices 2- to 6-flowered bracteolate cymules. *Flowers* ·2 to ·25 in. long. *Calyx* thick, deeply cupular or sub-campanulate, with 3 bold triangular lobes, glabrescent. *Petals* twice as long as the calyx, fleshy,

glabrous, broadly oblong, very concave, the apex much thickened and deeply inflexed and the sides partly inflexed to form a kind of hood. *Stamens* 6; the filaments much shorter than the oblong anthers, lanceolate, dilated at the base and inserted outside the quadrate lobes of the thin ring-like disc. *Ovary* ovoid-globose, glabrous, tapering into the short thick style: stigma discoid. *Ripe drupes* obliquely ovoid, flattened on one side, glabrous, 1·25 to 1·5 in. long, and about ·75 in. in diam; peduncle slender, ·5 to 1 in. long, scar of stigma terminal.

Perak: King's collector, Nos. 5304, 5580 and 7298.

6. SANTIRIA LAEVIGATA, Blume Mus. Bot. I, 211. A tree 50 to 100 feet high: young branches dark-coloured, lenticellate, glabrous. *Leaves* 9 to 17 in. long, glabrous: the rachises flattened below the lowest leaflet and channelled at the base. *Leaflets* coriaceous, elliptic-oblong to oblong, shortly acuminate; the base usually rounded or sub-cordate, but sometimes narrowed and sub-oblique: both surfaces reticulate, the lower brown when dry: main nerves 11 to 17 pairs, sub-horizontal, slightly prominent on the lower surface; length 4·5 to 9 in, breadth 1·5 to 2·8 in., petiolules about ·5 in. *Panicles* shorter than the leaves, axillary or slightly supra-axillary, solitary, 6 to 8 in. long (including the rather long peduncles), spreading; the branches ascending, puberulous near the apices where the flowers are crowded in conical ebracteolate cymes. *Flowers* less than ·1 in. long, shorter than the pedicels. *Calyx* cupular, the mouth almost entire or waved, minutely tomentose outside. *Petals* deltoid-rotund, the apex inflexed, valvate, glabrous. *Stamens* 6; anthers ovate, about as long as the filaments which are inserted by dilated bases outside the ring-like disc: rudimentary ovary small, ovoid. *Female flowers* not seen. *Ripe drupes* ·6 in. long, glabrous, broadly ovoid, blunt, flattened on one side, the remains of the stigma near the apex of the flattened side, peduncle ·5 in. long. A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 538; Engler in DeCand. Monog. Phanerog. IV, 165. *Canarium laevigatum*, Miq. Fl. Ind. Bat., Vol. I, Pt. 2, p. 648. *Canarium altissimum*, Herb. Korth.

Malacca; Griffith No. 1149, Maingay. Perak; King's collector, Nos. 4438, 5441, 5839 and 7961; Scortechini.—DISTRIB. Sumatra.

The leaves of this vary a good deal as to the number of the main nerves and as to the shape of the base, some having broad and even sub-cordate while others have cuneate bases.

7. SANTIRIA OBLONGIFOLIA, Blume in Mus. Bot. Lugd. Bat. I, 211. A tree 50 to 80 feet high: young branches pale, lenticellate, at first scurfy, afterwards glabrous. *Leaves* 12 to 18 in. long; their rachises terete, not winged at the base but slightly flattened, glabrous, the stipules (if any) deciduous. *Leaflets* 7 to 9 in., thinly coriaceous, oblong,

occasionally ovate-oblong or ovate, slightly unequilateral especially at the base; the apex very shortly abruptly and bluntly acuminate, edges entire; base in the oblong forms sub-cuneate, in the ovate forms broad and rounded; upper surfaces glabrous and reticulate, olivaceous when dry; the lower pale brown when dry, very minutely lepidote; main nerves 10 to 13 pairs (in the ovate forms only 7 or 8 pairs), spreading, interarching near the edge; length 4 to 6 in., the ovate forms shorter; breadth 1·75 to 2·25 in.; petiolules ·5 to ·7 in., the terminal one 1·5 in. *Panicles* axillary or terminal, shorter than the leaves, pale scurfy when young, divaricate, cymose, spreading, the flowers crowded near the extremities of the branches, ebracteolate. *Buds* ·1 in. in diam., sub-globular, about as long as the clavate pedicels. *Calyx* campanulate, deeply cut into 3, rotund, deltoid, sub-concave teeth, scurfy outside. *Petals* sub-rotund with a truncate base, slightly concave, longer than the calyx, puberulous outside, glabrous inside. *Stamens* 6. *Anthers* oblong, about as long as the filaments: the latter flattened, narrow, inserted outside the glabrous, thin, fleshy, lobed disc. *Ripe drupes* ovoid, ellipsoid or globose, flattened on one side, oblique, obscurely 3-gonous, glabrous, ·7 in. long, and ·5 in. in diam., the scar of the stigma at the apex of the flattened side. Engler in DeCand. Monog. Phanerog, IV, 162. *Santiria Maingayi*, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 538: Engler l. c. IV, 165. *Canarium oblongifolium*, Miq. Fl. Ind. Bat. I, Pt. 2, p. 645. *Canarium eupteron*, Miq. Fl. Ind. Bat., Vol. I, Pt. 2, p. 648.

Malacca, (Kew Distrib.) No. 310. Perak: a common tree, King's collector.—DISTRIB. Sumatra, Java, Borneo.

Blume's original description (drawn up from specimens from Java and Sumatra) suits this plant well. An authentic specimen of Miquel's *Canarium eupteron* shows that that species must be reduced here, as must Bennet's *Santiria Maingayi* of which Maingay's specimen No. 310 (Kew Distrib.) is the type. *Canarium sub-repandum*, Miq. is, according to its author, closely allied to *C. eupteron*, Miq. and should probably also be reduced to this.

8. SANTIRIA LONGIFOLIA, King n. sp A tree 10 to 20 feet high: young branches very stout, (·5 to ·75 in in diam.), their bark brown, glabrous, lenticellate. *Leaves* 2 to 3 feet long, glabrous; the rachises stout, flattened below the lowest leaflets, not winged at the bases. *Leaflets* 11 to 15 pairs, narrowly oblong, gradually tapering to the acuminate apex, the base oblique or rounded; main nerves 12 to 14 pairs, spreading, curved, not prominent: length 9 to 11 in., breadth 1·75 to 2·5 in.; petiolules ·65 to 1 in., stout, enlarged at each end. *Flowers* unknown. *Fruiting panicles* much shorter than the leaves, one or two in the axil of a leaf, unequal, only 4 to 7 in. long, glabrous, the branches short.

Ripe drupes ovoid, flattened on one side, the scar of the stigma terminal, glabrous, 1 in. long. and ·65 in. in diam.

Perak: King's collector, Nos. 3594, 6838.

This is so unlike any described species of *Santiria* that, in spite of the absence of flowers on the only specimens I have seen, I have ventured to name it. The small size of the tree and the large size of its leaves make it easy of recognition in the genus.

9. SANTIRIA WRAYI, King n. sp. A tree 20 to 30 feet high: young branches very thick, (·75 to 1 in. in diam.) *Leaves* 12 to 30 in. long; the rachises trigonous, channelled in the lower part and almost winged at the base, puberulous. *Leaflets* 13 to 15, membranous, oblong to elliptic-oblong, very shortly and bluntly acuminate; the base rounded, slightly oblique; upper surface shining, olivaceous when dry, the lower pale brown, both glabrous and reticulate; main nerves 10 to 15 pairs, spreading, curving, slightly prominent beneath, length 6 to 11 in., breadth 2·5 to 4 in.; petiolules thickened at both ends, ·5 to 1 in., the terminal one more than twice as long. *Panicles* 3 or 4 in. long, several densely crowded in the axils of one leaf, ebracteolate, puberulous or glabrescent below, the ultimate branches scurfy rufous-puberulous. *Flowers* ·1 or ·15 in. long, shorter than the pedicels. *Calyx* cupular, the mouth with 3, broad, shallow teeth, glabrous, with a few hairs near the edge. *Petals* valvate, rotund, glabrous, rather fleshy. *Stamens* 6; the anthers ovate, longer than the flattened filaments which are inserted on the outside of the edge of the ring-like, fleshly, glabrous, corrugated disc. *Rudimentary ovary* small, ovoid. *Female flowers* unknown. *Ripe drupes* obliquely ovoid, slightly compressed, blunt at each end, ·6 to ·75 in. long, glabrous, the scar of the stigma approximated to the peduncle, peduncle ·5 in. long.

Perak: Wray, Nos. 1423, 2970; King's collector, No. 3689; Scortechini No. 2095.

Allied to *S. conferta*, but with larger leaves and fruit, much less hairy panicles, and perfectly glabrous leaves.

10. SANTIRIA APICULATA, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 537. A tree 20 to 50 feet high: young branches with pale bark, puberulous. *Leaves* 6 to 8 in. long, stipules (if any) deciduous. *Leaflets* membranous, oblong, elliptic-oblong to ovate, more or less bluntly acuminate, the base rounded or cuneate, glabrous on both surfaces and reticulate especially on the lower; main nerves rather irregular, about 8 pairs, ascending, curved, slightly prominent beneath, length 3·5 to 5·5 in., breadth 1·75 to 2·25 in.; petiolules ·4 to ·6 in., the terminal longer. *Panicles* axillary, slender, shorter than the leaves, more or less pyramidal, glabrous, the flowers small and crowded near the puberulous

apices, bracteoles minute. *Flowers* ·1 in. or less in diam., their pedicels twice as long. *Calyx* cupular with 3 broad, shallow, blunt teeth, nearly glabrous. *Petals* rotund, glabrous. *Stamens* 6, inflexed; anthers ovate, about as long as the flattened filaments which are inserted by their slightly dilated bases outside the glabrous fleshy lobed and corrugated disc. *Rudimentary ovary* ovoid, sunk in the disc, pubescent; style very short; stigma 3-lobed, small, terminal. *Female flowers* in panicles like the males, the stamens with broader filaments: ovary broadly ovoid, pubescent, style very short: stigma large, discoid, cupulate, terminal, *Ripe drupes* ovoid-globose, ·5 in. long, glabrous, the scar of the stigma near the base, the pericarp thinly coriaceous. Engler in DeCand. Monogr. Phanerog. IV, 163.

Malacca: Maingay, Nos. 303, 308, 314 (Kew Distrib.) Perak: Scortechini 1701: King's collector;—Distrib.; Sumatra.

The fruit is remarkable for the close approximation of the remains of the stigma to the peduncle. The venation of the leaves is variable: in many specimens the main nerves bifurcate about half way between the midrib and the edge of the leaf, while in others there is no bifurcation at all.

11. Santiria costata, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 537. A tree: young branches with gray bark, rusty-puberulous at first, ultimately glabrous. *Leaves* 6 to 9 in. long: stipules (if any) deciduous; the rachises broadly channelled above in the lower part, but not winged at the base. *Leaflets* coriaceous, oblong-lanceolate to elliptic, shortly and bluntly acuminate, the base acute or rounded: upper surface quite glabrous and shining, the midrib prominent on both surfaces; lower surface boldly reticulate and with a few scattered hairs; the 9 to 11 pairs of main nerves spreading, curving, very prominent, rusty-pubescent; length 3·5 to 4·5 in., breadth 1·25 to 2 in.,; petiolules ·35 to ·5 in., thickened at both ends. *Panicles* solitary, much shorter than the leaves, (only about 3 in. long) few-branched, rusty-tomentose, deciduously bracteolate. *Flowers* ·1 in. long, in small fascicles at the ends of the branchlets; the slender pedicels about as long or longer. *Calyx* cupular, truncate, dentate, glabrescent. *Petals* much longer than the calyx, broadly ovate, blunt, concave, nearly glabrous. *Stamens* 6; the filaments about as long as the anthers, slender and inserted beneath the margin of the outside of the small ring-like disc. *Ripe drupes* narrowly ovoid, slightly flattened on one side, ·75 in. long and ·5 in. in diam., the scar of the stigma apical. Engler in DeCandolle Monogr. Phanerog. IV, 157.

Malacca: Maingay (Kew Distrib.) No. 313. Perak: King's collector, No. 7597.

The short rusty-tomentose panicles, and almost glabrous flowers on slender pedicels distinguish this from *S. fasciculata*, to which it is closely allied. The leaves also give diagnostic marks, those of this species having more nerves and being pubescent beneath.

12. SANTIRIA CONFERTA, A. W. Benn. in Hook. fil. Fl Br. Ind. I, 537. A tree: young shoots rather stout (·35 in. in diam.), rusty-puberulous, afterwards glabrous and striate. *Leaves* 12 to 18 in. long; stipules (if any) deciduous, the rachis rufous-puberulous when young. *Leaflets* coriaceous, 9 to 13, oblong to oblong-lanceolate, gradually tapering to the acuminate apex, the base rounded: upper surface glabrous, shining, minutely reticulate, olivaceous when dry; the lower brown when dry, minutely rusty-puberulous when young; main nerves about 10 pairs, spreading, curving, slightly prominent on the lower surface: length 3·5 to 6 in., breadth 1·6 to 2 in., petiolules ·6 to ·7 in. *Panicles* 3 to 4 in. long, several from an axil and much shorter than the leaves, rufous-pubescent, densely crowded, bracteoles minute; pedicels slightly shorter than the flowers. Flowers ·1 to ·15 in. long. *Calyx* cupular, with 3 shallow broad teeth, rusty-tomentose outside. *Petals* imbricate, rotund, concave, puberulous. *Stamens* 6, inflexed, the anthers ovate, about as long as the flat filaments which are inserted on the edge of the fleshy ring-like disc; *rudimentary ovary* small, glabrous, ovoid. *Female flowers* not seen. *Ripe drupes* obliquely ovoid, dark-coloured, glabrous, rather less than ·5 in. long, the scar of the stigma near the base, pericarp stoutly coriaceous. Engler in De Candolle Monogr. Phanerog. IV, 160.

Malacca: Maingay (Kew Distrib.) No. 306, Griffith No. 1150.

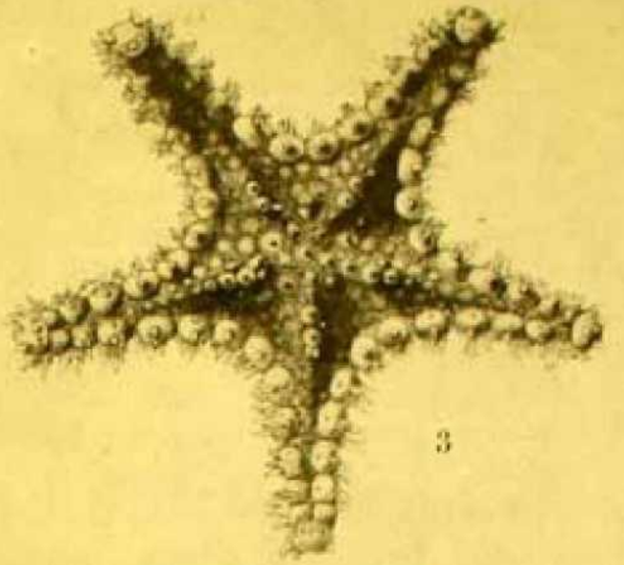
This is readily distinguished by its crowded condensed rufous-tomentose panicles and small glabrous fruit.

13. SANTIRIA MULTIFLORA, A. W. Benn. in Hook. fil. Fl. Br. Ind. I, 538. A tree, 60 to 100 feet high: young branches rather stout (·35 to ·5 in. in diam.), densely and minutely rusty-tomentose like the rachises and under surfaces of the leaves and the inflorescence. *Leaves* 9 to 15 in. long; the rachises terete in the upper part, but channelled near the base. *Leaflets* 5 to 7, coriaceous, oblong or elliptic-oblong, tapering slightly to the shortly acuminate apex; the base cuneate or obliquely rounded; upper surface glabrescent except the tomentose midrib and 15 to 20 pairs of sub-horizontal main nerves which are bold and prominent on the lower surface; length 4·5 to 10 in., breadth 2 to 3 in., petiolules ·4 to ·5 in. *Panicles* axillary or terminal, solitary, shorter than the leaves, ebracteolate, (? bracteoles caducous) spreading. *Flowers* crowded at the extremities, ·1 in. long, slightly longer than their tomentose pedicels. *Calyx* a shallow cup, the mouth almost entire or with 3 shallow wavy teeth, tomentose outside. *Petals* much longer than the

calyx, slightly imbricate, thick, broadly ovate, obtuse, with short slightly inflexed apical appendix, glabrous. *Stamens* 6, the ovate anthers about as long as the thick flattish filaments which are inserted on the edge of the thick fleshy ring-like disc; *rudimentary ovary* ovoid, minute. *Female flowers* not seen. *Ripe drupes* ovoid-globose, flattened on one side, ·75 in. long, glabrous, the scar of the stigma below the apex of the flattened side. Engler in DeCand. Monogr. Phanerog. IV, 160.

Malacca: Griffith, No. 1151; Maingay (Kew Distrib.) No. 305. Perak: King's collector.

I quite agree with the author of this species that, when better material of *Santiria tomentosa*, Blume (Mus. Lugd. Bat. I, 211), shall be forthcoming, the two will probably be found to be identical.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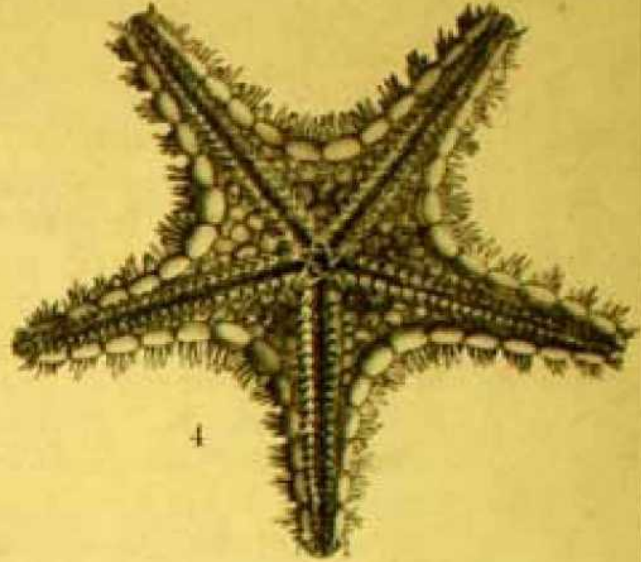
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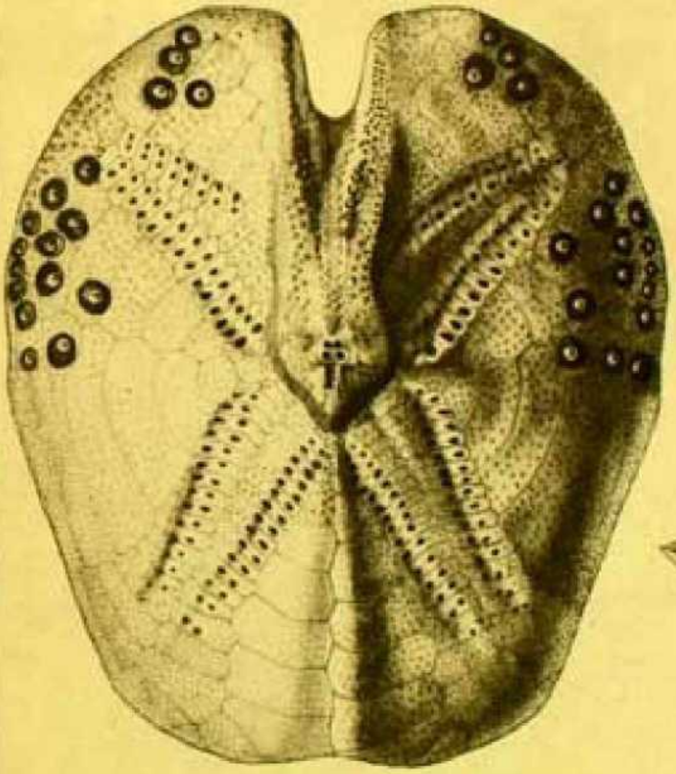
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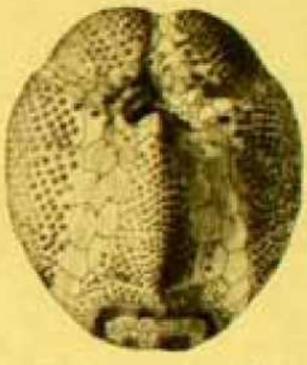
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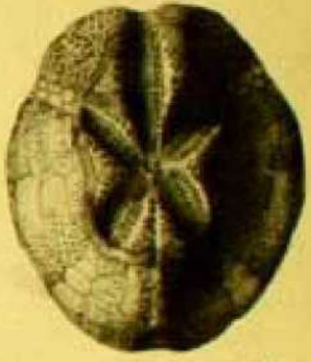
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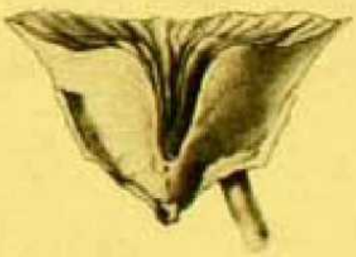
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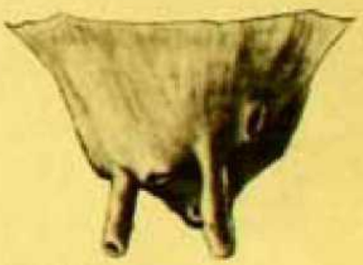
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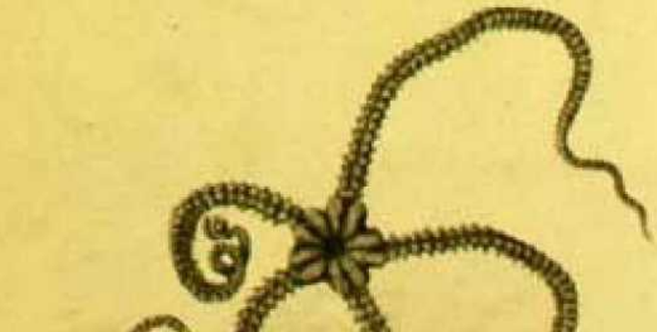
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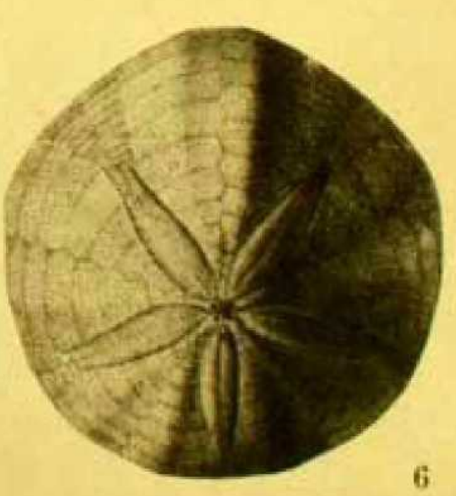
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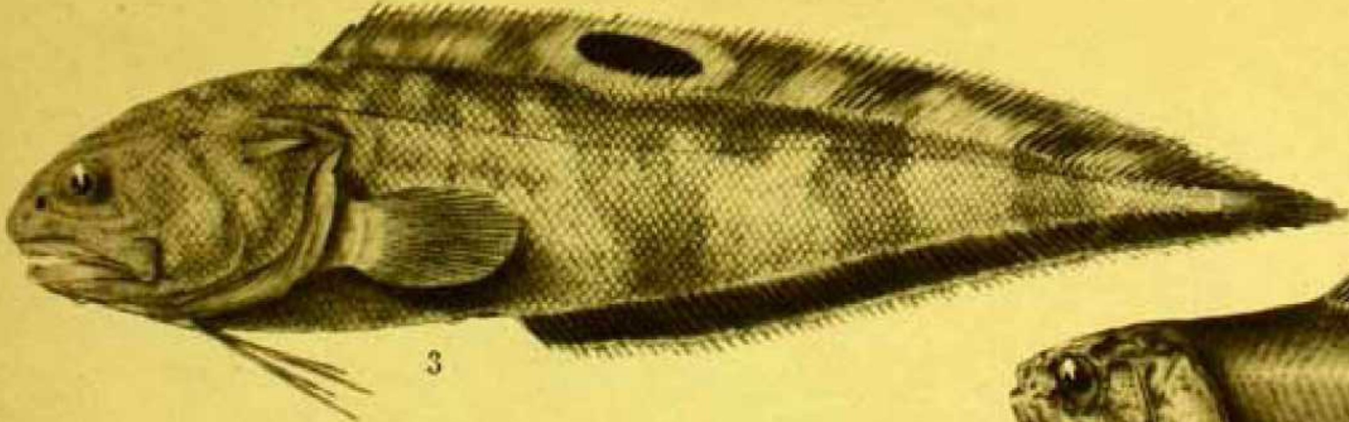
INDIAN ECHINODERMS AND CORALS.



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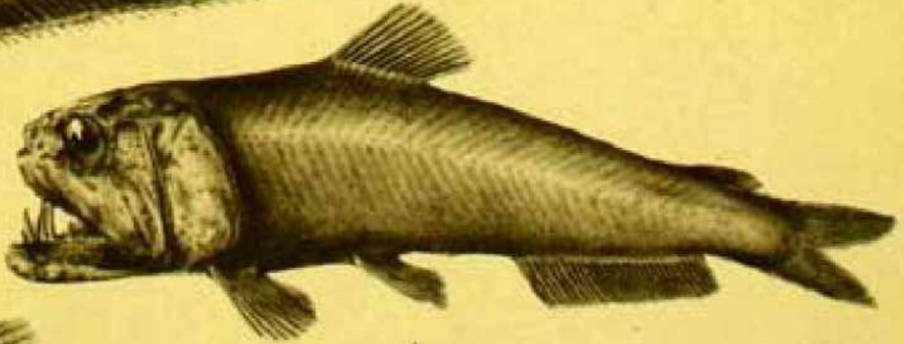

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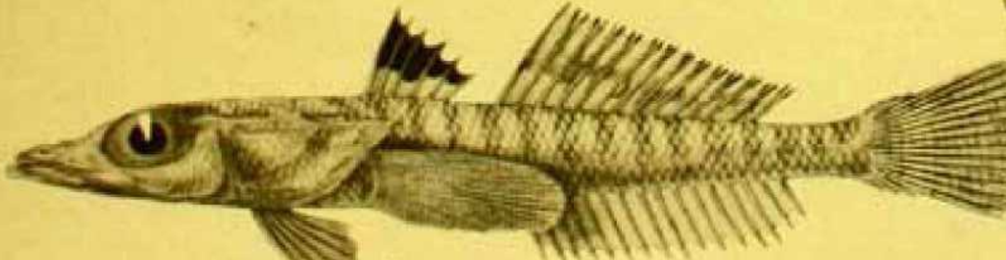

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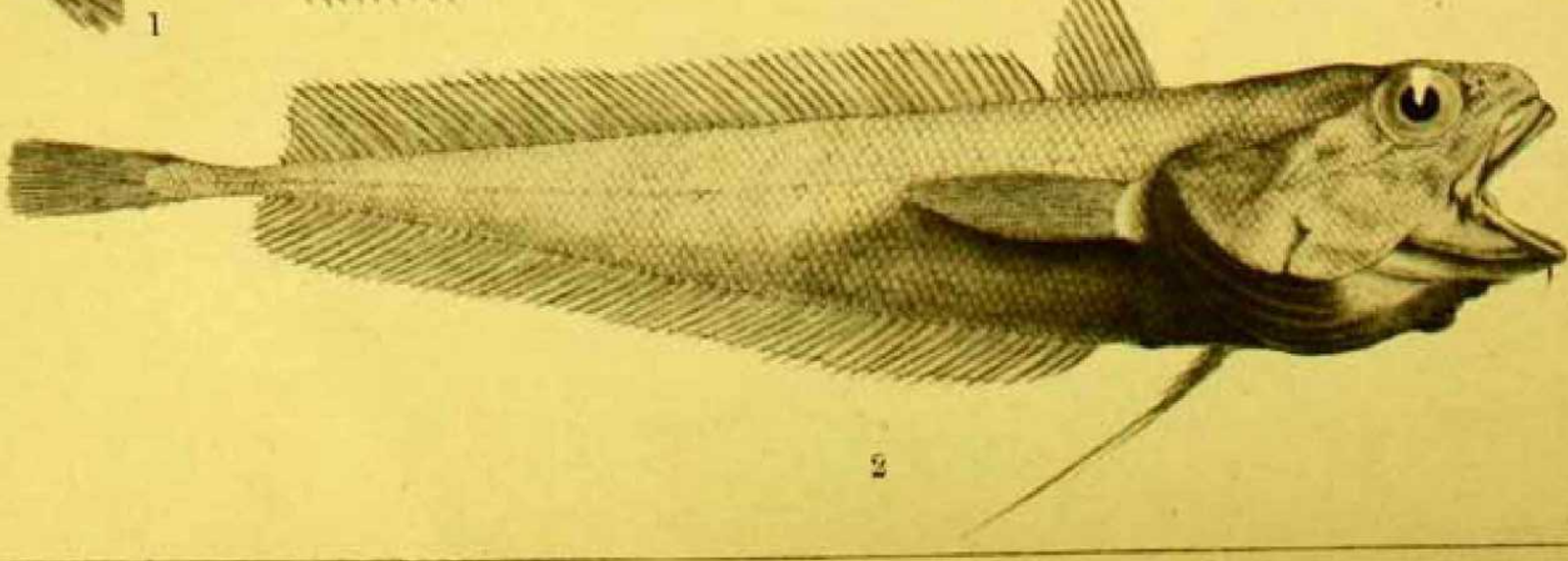

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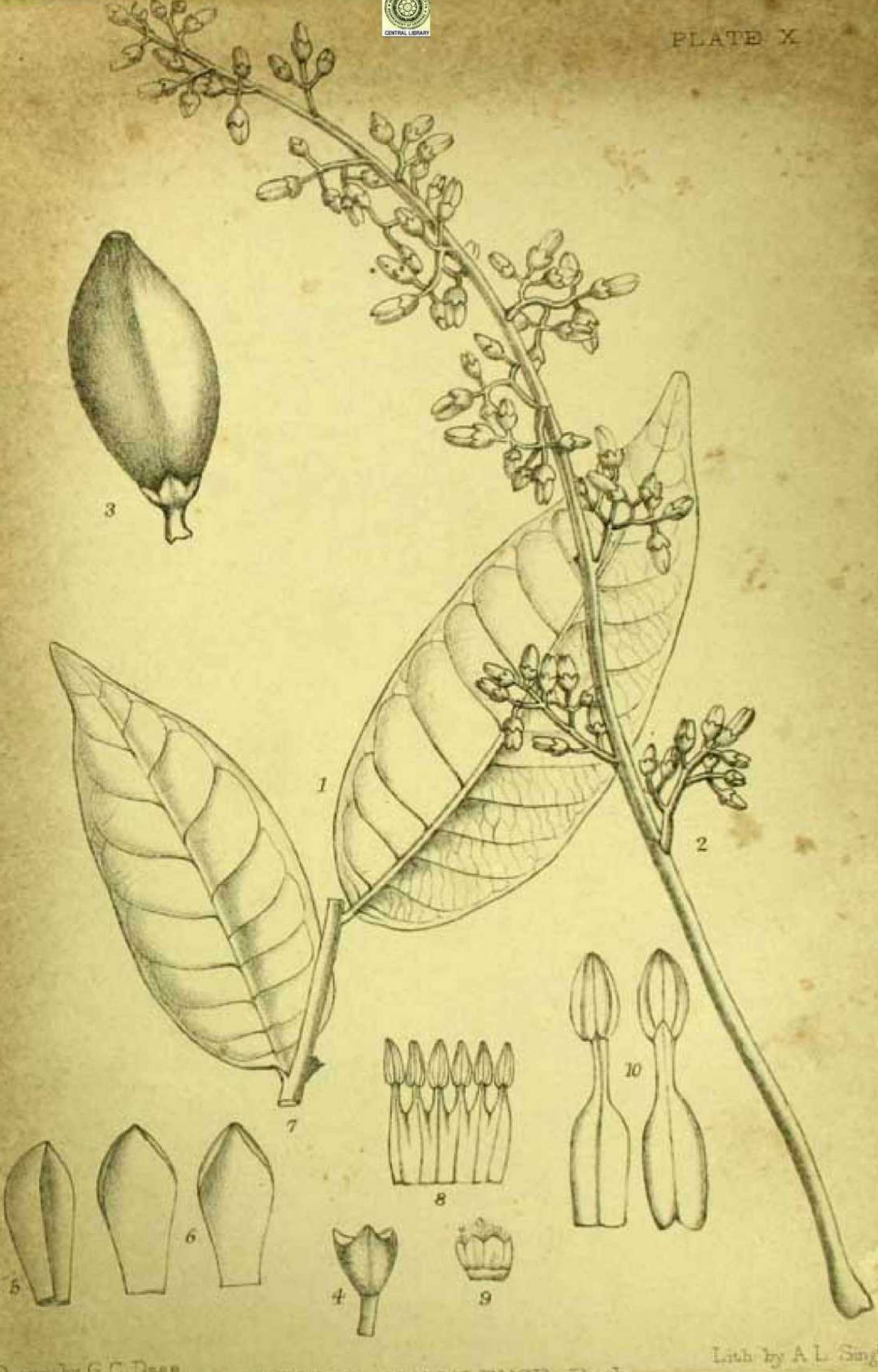
INDIAN DEEP-SEA FISHES.

PLATE X.



Drawn by G C Dass

Lith by A L Singh

CANARIUM BENGALENSE, Roxb.

PLATE XI.

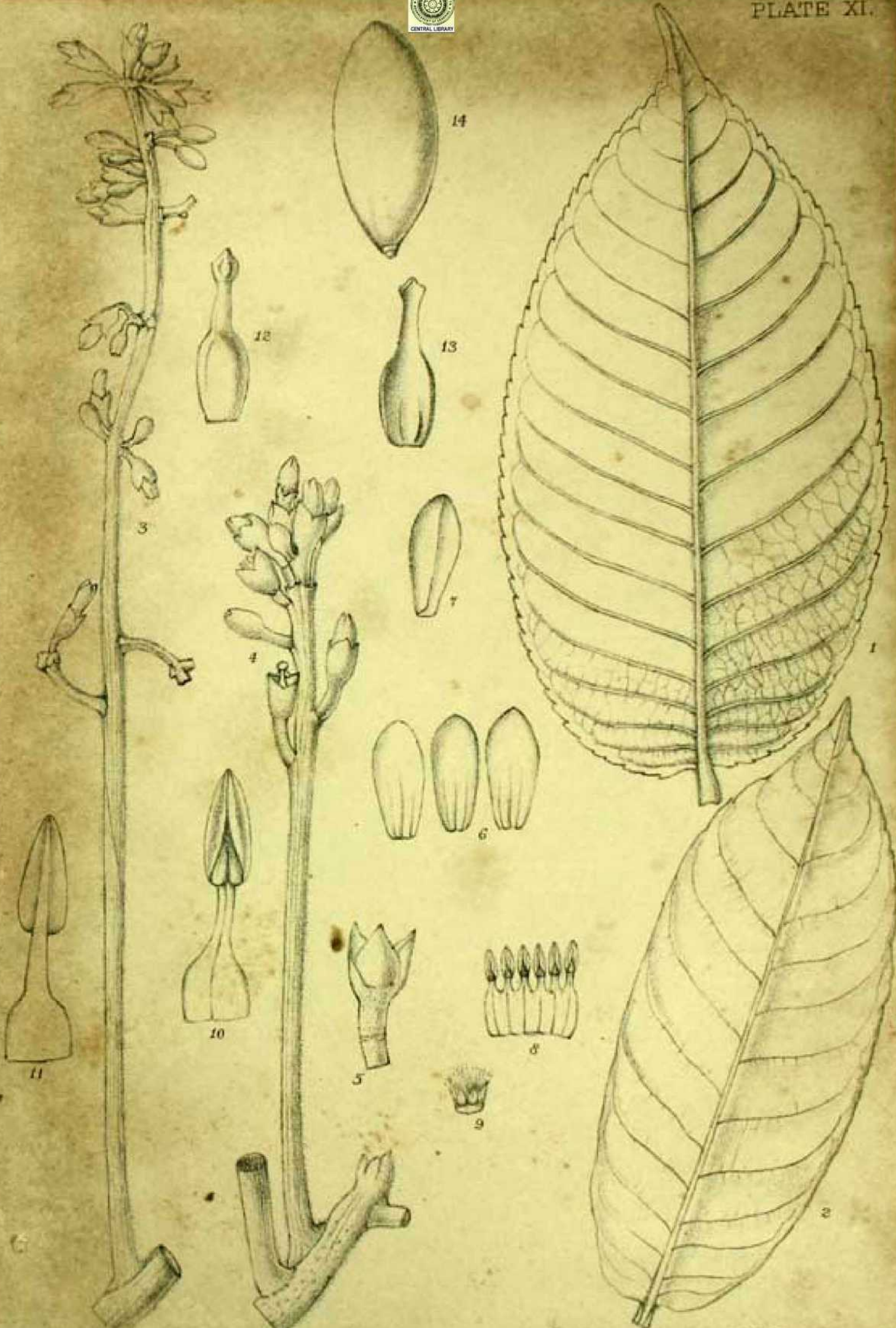
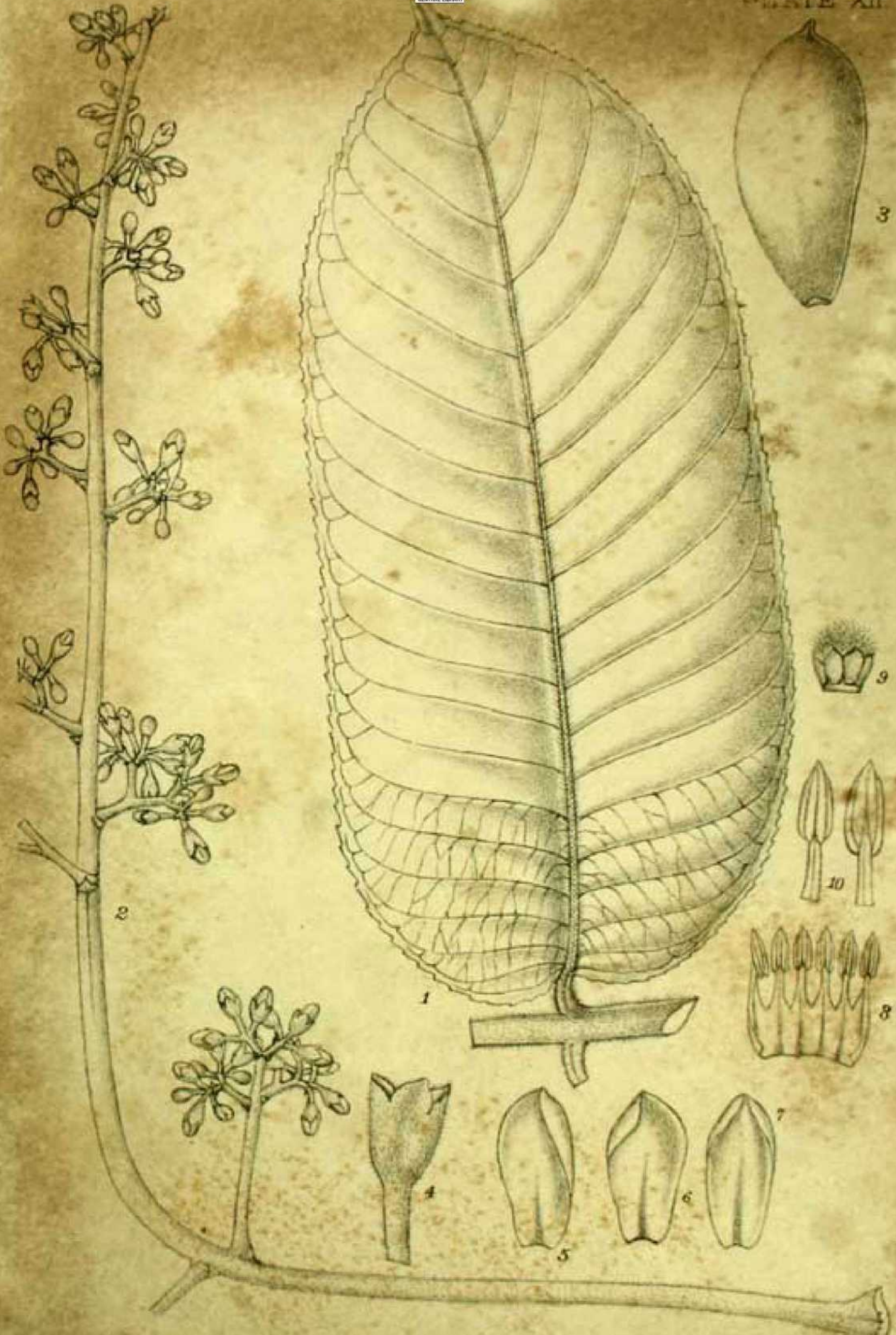


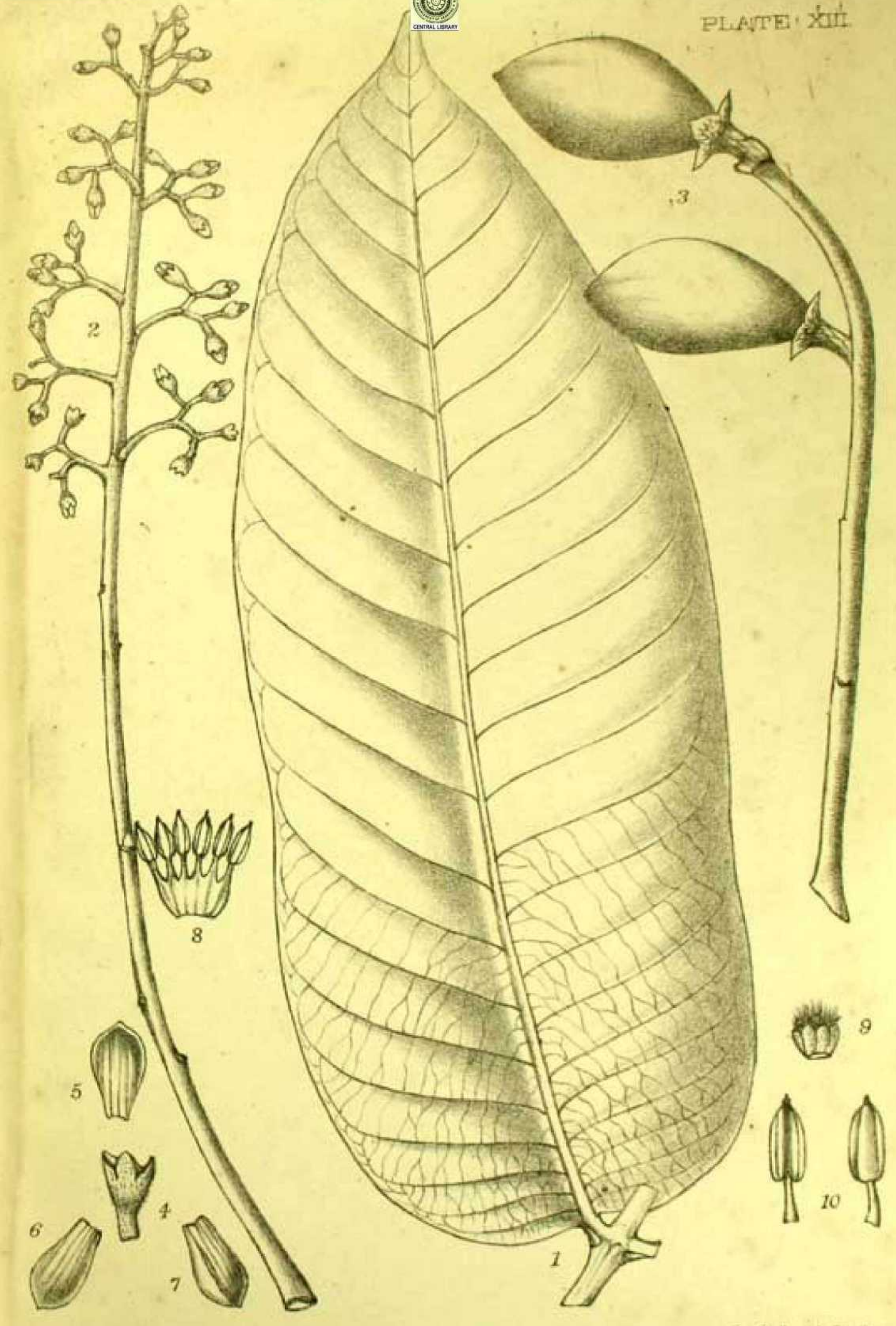
PLATE XII



Drawn by A. D. Molla.

CANARIUM SIKKIMENSE King.

Lith by A.D. Molla.



Drawn by A. D. Molla

Lith by A. L. Singh

CANARIUM RESINIFERUM, Brace.